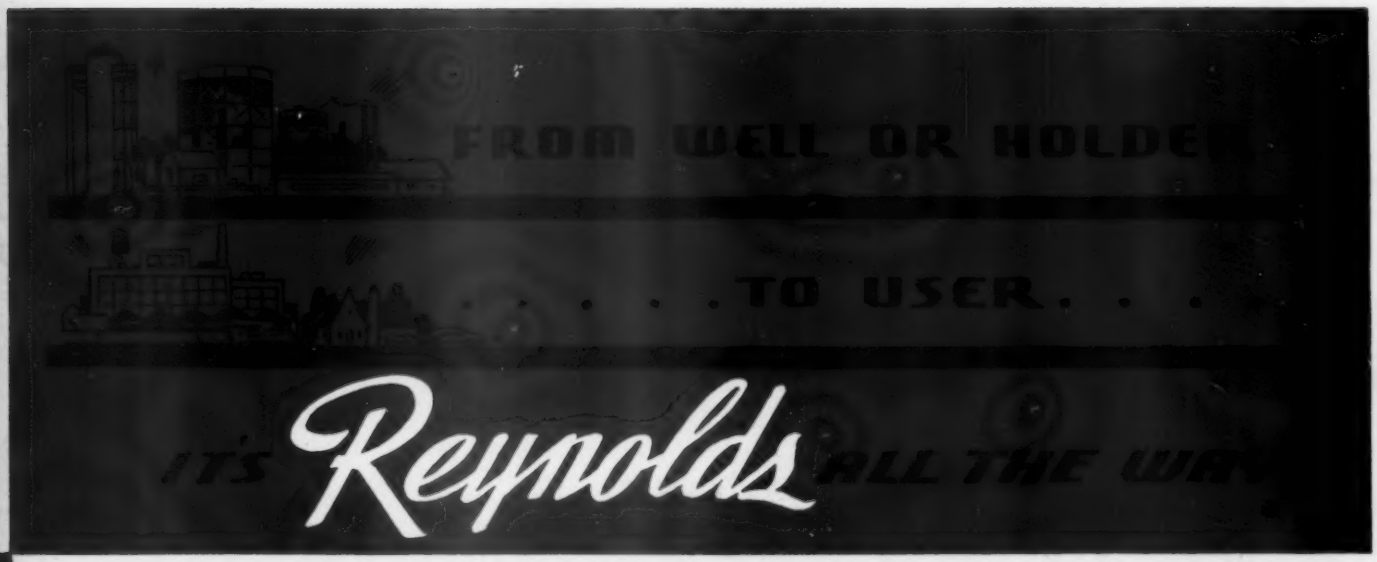
AMERICAN GAS JOURNAL

MAY, 1939



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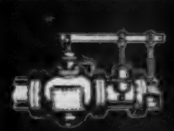
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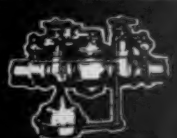
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COMPOSITE VIEW OF THE MOST MODERN AND BEST EQUIPPED METER, REGULATOR AND VALVE FACTORIES

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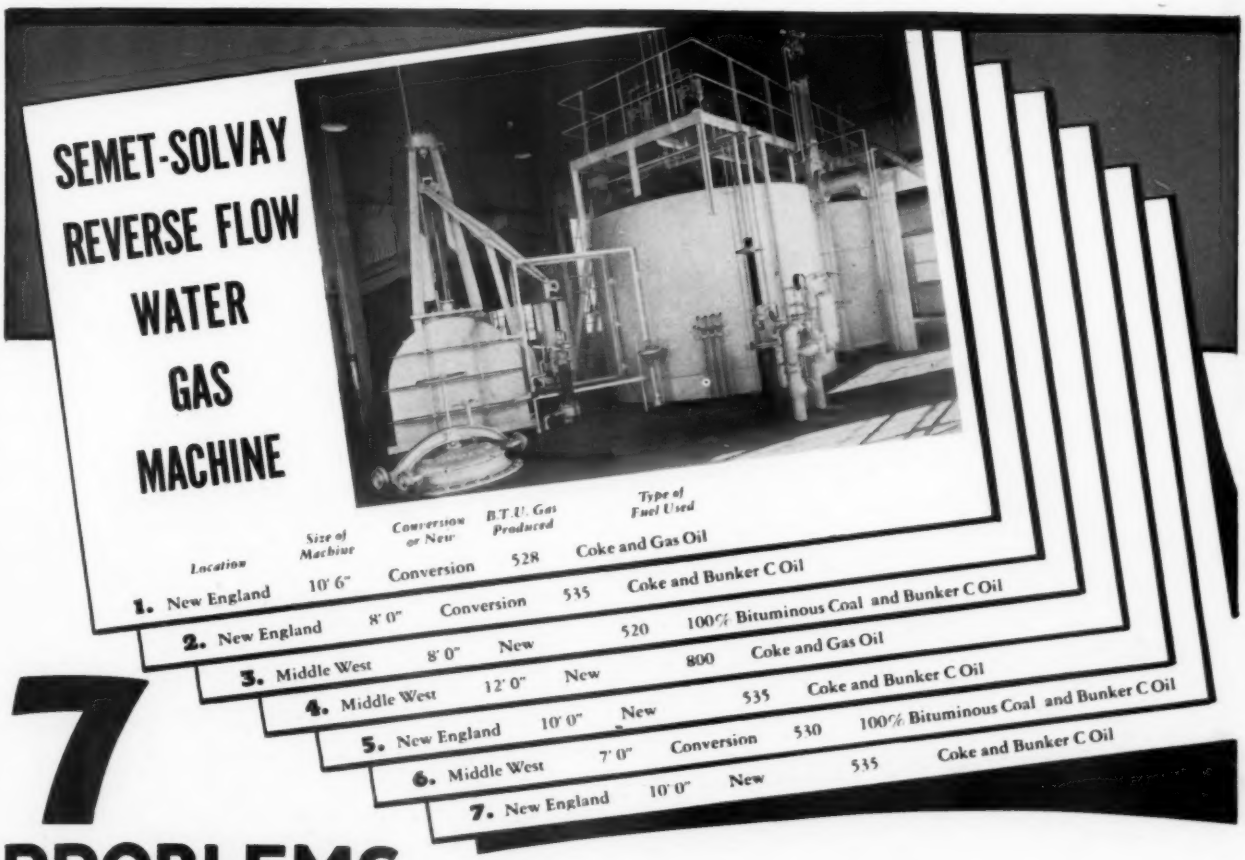

Location	Size of Machine	Conversion or New	B.T.U. Gas Produced	Type of Fuel Used
1. New England	10' 6"	Conversion	528	Coke and Gas Oil
2. New England	8' 0"	Conversion	535	Coke and Bunker C Oil
3. Middle West	8' 0"	New	520	100% Bituminous Coal and Bunker C Oil
4. Middle West	12' 0"	New	800	Coke and Gas Oil
5. New England	10' 0"	New	535	Coke and Bunker C Oil
6. Middle West	7' 0"	Conversion	530	100% Bituminous Coal and Bunker C Oil
7. New England	10' 0"	New	535	Coke and Bunker C Oil

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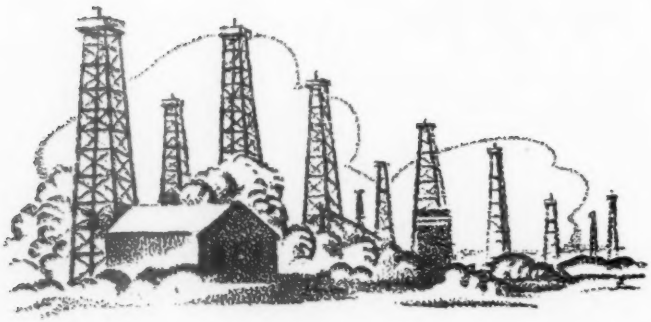

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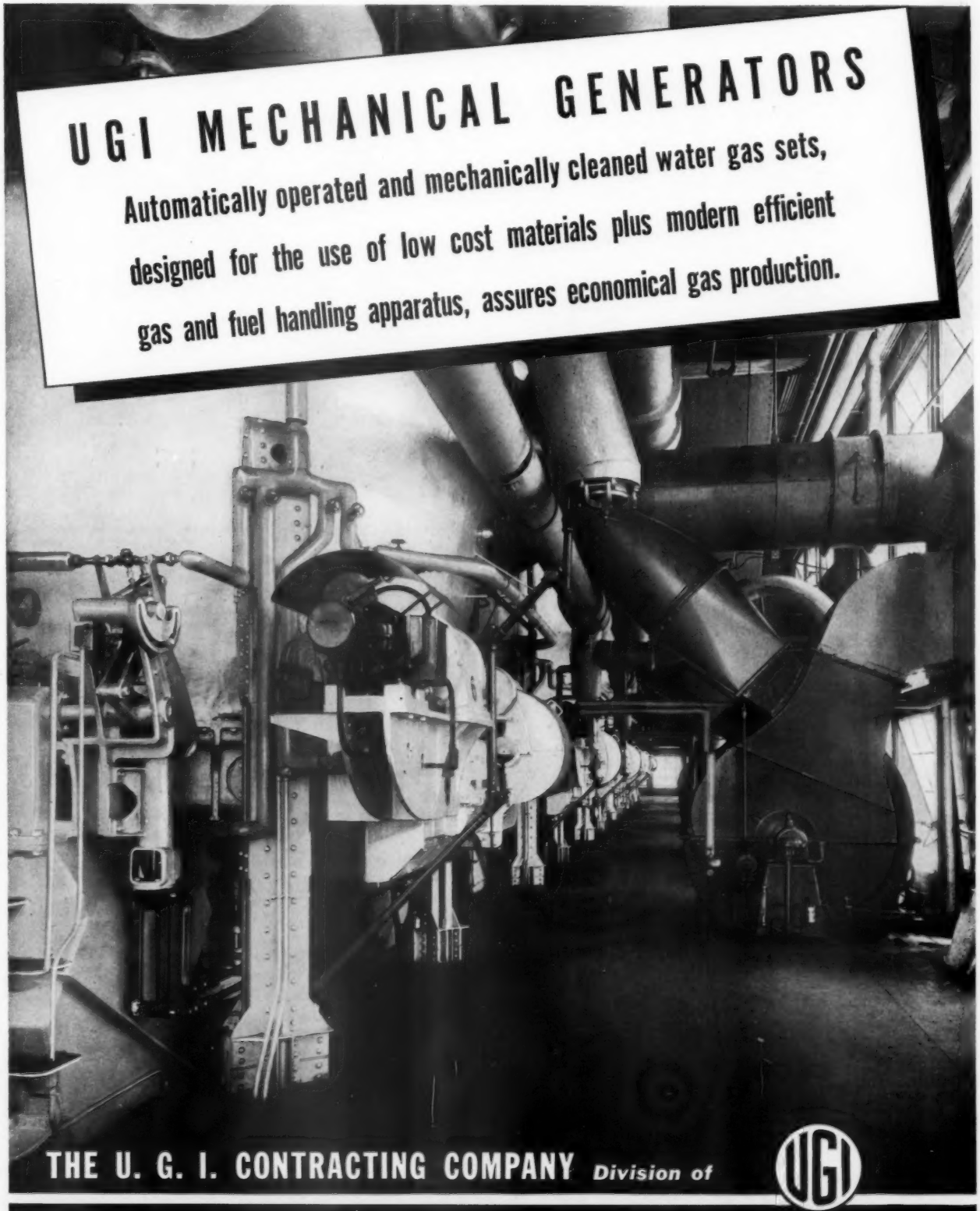
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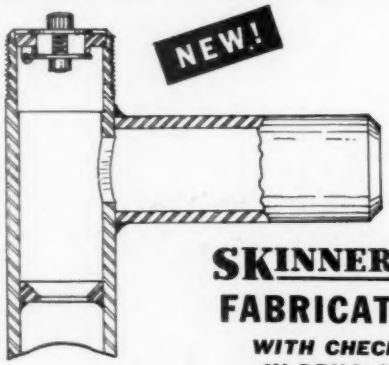

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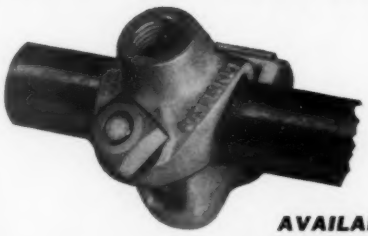

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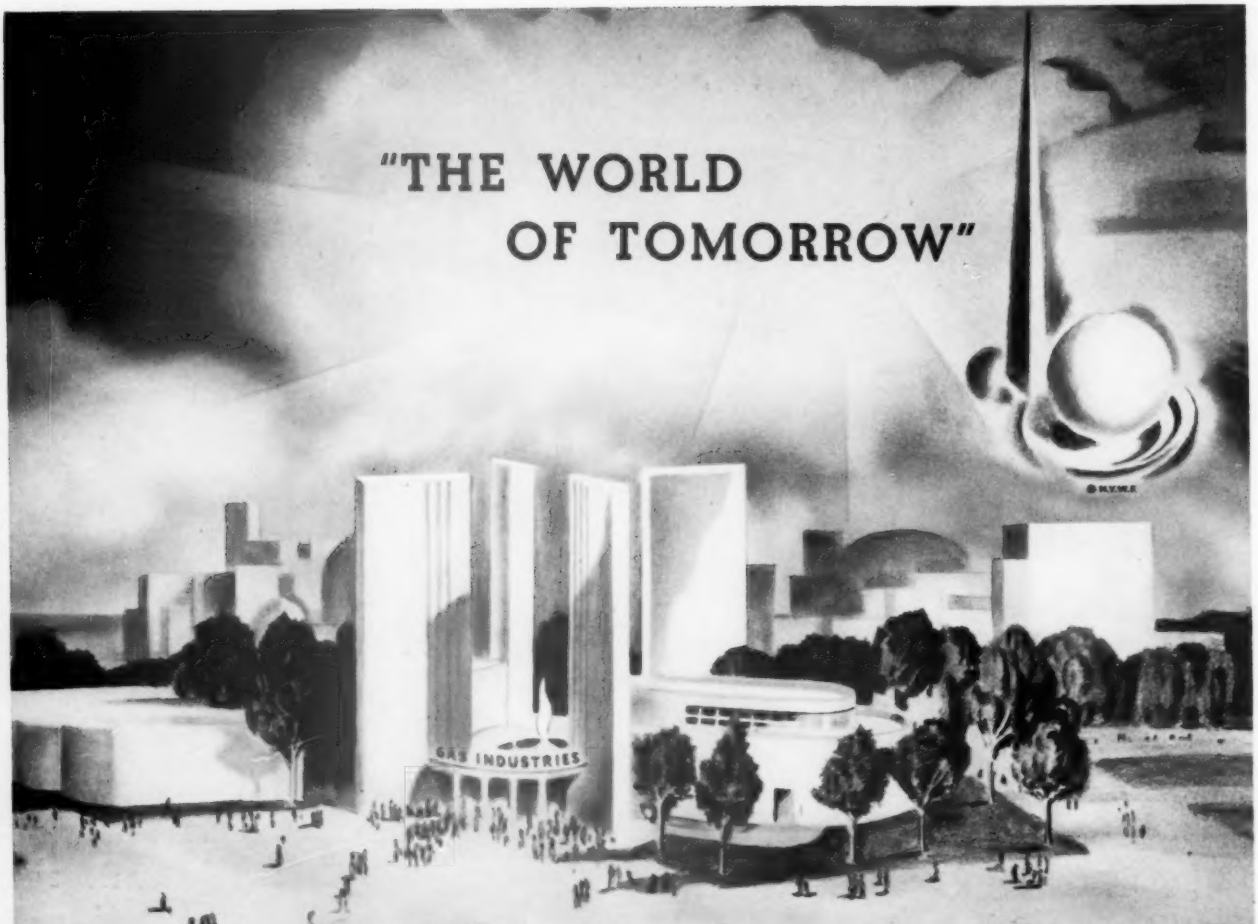

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No. 5

The Development and Growth of Natural Gas In Oklahoma

Photo Blank & Stoller

by
Frank B. Long,
Vice President Oklahoma Natural Gas Company
Tulsa, Oklahoma

THE natural gas industry owes a vast debt to Oklahoma.

In many ways, Oklahoma has been the "testing ground" for natural gas experiments.

And Oklahoma is indebted to natural gas. Natural gas has been good to Oklahoma.

In Oklahoma, natural gas and oil travel a parallel road. In both Oklahoma and the Oil Capital of the World, the two industries are truly one industry—the "oil and gas business."

At the turn of the century, from Pennsylvania to Tulsa and the Indian Territory came the trail blazers of the oil and gas industry—T. N. Barnsdall, Glenn T. Braden, and scores of others—wildcatters all; courageous, venturesome, intrepid.

Oklahoma "grew up" with natural gas.

Tulsa is an "all gas" city.

Cities and towns in Oklahoma, served by natural gas, have a greater percentage of gas heated homes than any other similar portion of the nation.

More homes in Tulsa are "all gas" homes than in any other city of comparable population.

Natural gas is responsible for practically all of Oklahoma's industrial development. Natural gas enabled the operators of lead and zinc smelters and glass factories to compete successfully with all other portions of the nation. First Collinsville and Bartlesville, then Sand Springs, and finally the Henryetta-Dewar area were the smelting centers of the United States. Today, Okmulgee, Henryetta, Sand Springs, and Sapulpa are known as "glass cities" and are truly the "glass centers" of the nation. In the manufacture of brick, tile and cement and in the smelting of ores, fuel cost is from 45 to 50 per cent of the total cost of manufacture. Oklahoma's natural gas reserves and the rates available to industries have been directly responsible for the location of cement plants, glass factories, and smelters in Oklahoma.

To natural gas, Oklahoma owes its reputation of "the cleanest state in America". Particularly is this true in all of Oklahoma's major cities.

For more than forty years, industry has followed the development of natural gas; from Pennsylvania to Ohio, to Indiana, to Kansas, to Oklahoma, and to Texas. Due to the wise management, vision, and foresight of gas producers and distributors in Oklahoma, a major portion of Oklahoma's gas reserves are under contract for Oklahoma's industries and customers.

Oklahoma is served by one major gas company, Oklahoma Natural Gas Company. This company's gathering system extends from Ardmore north to Tulsa and Enid territory. It serves all the principal cities in the state except Chickasha, Ada, and McAlester. Southwestern Light and Power Company serves Chickasha; the Public Service Company of Oklahoma serves McAlester; and Ada purchases its gas from Southwest Utilities Service Corporation.

Cities Service Gas Company, with operating headquarters in Bartlesville, has two main trunk lines north into its Kansas and Missouri markets from Oklahoma, and Lone Star Gas Company, with operating headquarters in Dallas, has two main lines—

one from the Ardmore District and one from the Chickasha District—south into Texas.

Oklahoma now ranks second in the production of natural gas; Texas standing first.

Natural gas in the state of Oklahoma has had a colorful history. The trail was blazed by red-fisted pioneers. The first major production was in the Canary pool, joining the Kansas line immediately south of Caney, and the Nowata-Bartlesville district. At the same time wells were drilled along the Osage - Creek County line west of Tulsa. Tulsa, Bartlesville, and Nowata were the first towns to be piped for natural gas.

The Canary pool, the area surrounding Bartlesville, and the northern end of the Hogshooter field on the Washington-Nowata County line area, became a part of the vast system owned and operated by the Kansas Natural Gas Company.

In the very early days, smelters were operated at Caney, Kansas, and lines were projected from Oklahoma to Kansas City and other towns in Missouri in exactly the same manner and the same method of operation that lines had previously been built from central Indiana north to Chicago.

Charles N. Haskell, Oklahoma's first governor, waged a two-year fight against piping gas out of Oklahoma. The state legislature acted promptly and Governor Haskell acted decisively. For two years he prevented the Quapaw Gas Company from piping gas across the line into Kansas. The situation became so desperate the Governor declared martial law in northern Washington County and surrounded the end of Quapaw Gas Company's line with several companies of national guard. Haskell's orders to the soldiers were, "Oklahoma gas must not leave Oklahoma". The soldiers camped there for several days. One morning a United States marshal appeared with an order from the Federal Court. A clash between federal and state authorities was threatened. Haskell, however, recognized the power of the federal government and reluctantly bowed his head to interstate law.

It developed, however, that there was not a great deal of cause for the governor's position because rapid development of oil and gas throughout the state brought to the surface more natural gas than could possibly be utilized.

T. N. Barnsdall, of Pittsburgh, the trail blazing pioneer of pioneers, Dennis T. Flynn, of Oklahoma City, and the late Glenn T. Braden organized Oklahoma Natural Gas Company. These pioneers constructed in 1907 a natural gas line from a point southwest of Tulsa to Oklahoma City. This line was the first major transmission line in the state and is the hub around which Oklahoma Natural's 3400 miles of line were subsequently constructed. The Taneha area between Sapulpa and Tulsa furnished gas both to the Tulsa and Oklahoma City districts.

With the beginning of Oklahoma's growth and development and the discovery of new oil and gas fields, Oklahoma's natural gas systems kept ahead not only of drilling operations, but of increase in population. During this period of development and the decline of pressure and volume in Kansas fields, the Kanas Natural Gas Company, which operated interstate lines, went into receivership.

The properties were operated by John N. Landon, father of Alf Landon, under the direction of Judge John T. Pollock, of the Kansas Federal Court. All of the Kansas Natural Gas Company's properties subsequently were taken over by the Cities Service Gas Company. New lines were laid throughout Kansas and into Oklahoma. Afterwards, these were extended to the Texas Panhandle. The result of the wise management on the part of Cities Service Gas Company is that the Kansas and Missouri markets now have ample reserves behind them and Oklahoma still is properly protected.

Development in the Hogshooter district in Washington and Nowata Counties was quickly followed by new wells in the Bixby-Mounds area around the edges of the Glenn pool, and, in 1912-1913, in the Cushing field.

The Cushing field, in Creek County, taught natural gas producers their most valuable lesson. In the Wheeler sand (above the Bartlesville in the Cushing field), tremendous quantities of dry gas were encountered. It was impossible to overcome the pressure in order to drill on into the Bartlesville sand. Day after day and week after week, the Wheeler sand wells were wide open and billions of feet of gas blew into the air. There was no market for the gas. In 1913, Alf G. Heggem, of Tulsa, then an engineer for the Bureau of Mines, developed and perfected the "mudding in" process.

Under the Heggem method, natural gas was confined to its original stratum. Producers objected, of course. Heggem finally educated them. Heggem's process has saved billions of cubic feet of gas and millions of dollars for the industry. The process is still in use. Heggem demonstrated his loyalty to his job by making no effort to patent his process or protect his rights. He gave it all to the industry.

In 1922, at a time when a shortage of gas in Oklahoma was indicated, the Chickasha field in Grady County was opened. Gas from Chickasha was brought east through Oklahoma City. The system so wisely laid out by Barnsdall, Flynn, and Braden in 1908 and 1909 was literally "turned around." Oklahoma citizens had splendid gas service.

Indicating the widely changing natural gas picture in Oklahoma and the existence of untested reserves, on Saturday, April 8, Carter Oil Company, Oklahoma Natural Gas Company, Magnolia Petroleum Corporation, and others completed a new well in the heart of the old Chickasha field at an approximate depth of 5400 feet, which tested, after Lane-Wells shots, more than 20 million open flow. The Chickasha field, famous for nearly twenty years, now has every indication of a revival. The deepest horizon prior to April, 1939, was 2500 feet.

In 1935, 1936, 1937 and 1938, the Cement field, on the Grady-Caddo County line became a major producer. During the early part of 1938, Magnolia Petroleum Corporation completed, shut in, and tested its Niles No. 10 well, the largest dry gas well of which the nation has any record. The original spring gauge test open flow was 224,400,000 cubic feet daily, with rock pressure of 1650 pounds; total depth 4450 feet. Under the Bureau of Mines back pressure test method, this well now actually shows 640,000,000 cubic feet daily.

In the east portion of the Cement field, eight miles from the Magnolia well, Oklahoma Natural Gas Company completed a well in March 1938, at a depth of 5026 feet, which had open flow of 161,700,000 cubic feet daily with rock pressure of 2025 pounds. In the Cement field, there are eighteen known producing sands.

Just prior to the opening of the Chickasha field, the Quinton field, in eastern Oklahoma, was under development. Until 1930, markets for gas from the Quinton field were confined to a lead and zinc smelter in the town of Quinton and to the city of McAlester. This field, 20 miles long and 3 miles wide, is now connected with Oklahoma Natural Gas Company's main line system by two 16-inch lines. Through these lines, Quinton gas can be transported west into Oklahoma City.

Development in the Seminole field

in 1926, the Oklahoma City field in 1929 and 1930, and the Edmond and Crescent fields at about the same time, presented a new problem to the natural gas industry—casinghead gas or "tailhouse gas." Natural gas of this character is now furnishing about one-half of Oklahoma's supply.

"Tailhouse gas" pays its way handsomely. It lifts the oil by its own pressure, saving pumping costs. The gas and oil are delivered into new and modern gas-tight tanks. Connected to these tanks are high pressure separators in which the gas and oil are separated. The gas, having done its job efficiently, leaves the separators and is taken into gasoline plants. Each thousand feet of natural gas has already more than paid its way in lifting the oil. In the absorption plants, it pays to the oil producer and the royalty owner from one to three gallons of gasoline per thousand cubic feet. The residue or "tailhouse gas" leaves the gasoline plant valueless because its pressure has been reduced from normal well pressure to from 20 to 40 pounds. A great deal of this so-called "wet" gas, or gas that comes with oil through the casinghead, is not usable. The moisture must be extracted from it before it can be safely turned into homes. The gasoline plant cleanses the gas, removing the liquid gas as well as other moisture, without materially lessening its heat value. The gasoline plant, however, destroys the value of the natural gas to a pipe line company because the normal well pressure is cut down. "Tailhouse gas" on that account is worth just exactly what a ten carat diamond would be in the middle of the Sahara Desert. It must be removed from the Desert to have any value. So must the gas. Its pressure must be stepped up so that it will travel from the gasoline plants to markets. This process is costly, but utilization of gas of this character is real conservation.

After leaving the gasoline plant, this precious fuel is picked up by giant compressors, the pressure is stepped up to from 250 to 350 pounds, and under that pressure the gas travels into main line systems, then, as the pressure diminishes, into the homes of the more than 200,000 customers in Oklahoma.

The Corporation Commission of Oklahoma, the state's regulatory body, cooperates wholeheartedly with producers of oil and gas in efforts to find a market for "tailhouse gas" in lieu of gas from dry gas wells.

The future of natural gas in Oklahoma is exactly what the citizens of the state and the producers of oil and gas make it. Oklahoma Natural's engineering department estimates potential reserves in the state sufficient for more than thirty years. This estimate is conservative.

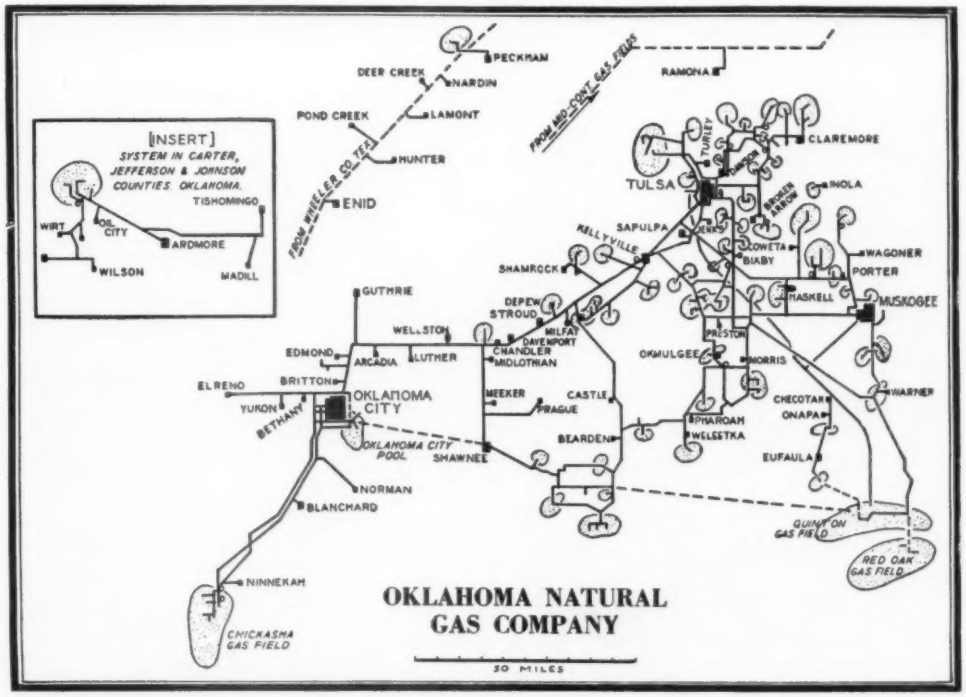
These reserves are not at the present time all connected to transportation systems. Additional new lines will have to be laid throughout the state. Many lines now in use will have to be taken up and relaid. There is development south of the Canadian River, indicating a need of 35 or 40 miles of extensions within the next few years. Drilling activity continues west and north from Oklahoma City. The next decade or more will see many hundreds of miles of new large pipe lines laid and in operation.

This estimate of reserves is based not only upon the supply available but also upon the continuation of present wise methods of conservation. There must never again be a repetition of the waste of more than 400,000,000 feet daily which occurred in the Oklahoma City field. Alf Heggem's "mudding in" process will prevent a repetition of the Cushing crime. New and novel methods of maintaining bottom hole pressure; repressuring old abandoned districts; proration; and introduction of surplus gas into under-ground storage reservoirs will, in the opinion of the writer, prevent a repetition of the waste of gas in the Oklahoma City field in 1932, 1933, 1934 and 1935.

In defense of the owners of production in the Oklahoma City field, it should be said that the gas wasn't entirely wasted. It paid its way throughout the development of the Oklahoma City field. It brought the producers' oil to the ground and more than earned its share of dividends in the production of natural gasoline.

One of the most interesting and romantic features of the natural gas industry in this year 1939 will be the

(Concluded on page 70)



Natural Gas in Kansas

By
J. H. Page

Natural Gas Engineer for
State Corporation Commission
Conservation Division
Wichita, Kansas

IN CONSIDERING the natural gas resources and their development in Kansas, it is logical to divide the state into two provinces. These are designated Eastern and Western Kansas, the former comprising about 35 percent, and the latter 65 percent of the state's area. Gas development in the state dates back to the year 1860, when several wells were drilled in Miami County, near the town of Paola. Very little additional drilling took place for some years, however, and it was not until 1884 that enough gas production had been developed to justify a pipe line, which was constructed to Paola in that year. This was the first town to be served with natural gas in Kansas. Development spread to other parts of Southeast Kansas, and by 1900 gas had been discovered in some fifteen counties.

CUNNINGHAM COMPRESSOR STATION AND GASOLINE PLANT OF SKELLY OIL COMPANY — THE LARGEST PRESSURE MAINTENANCE PROJECT IN KANSAS.

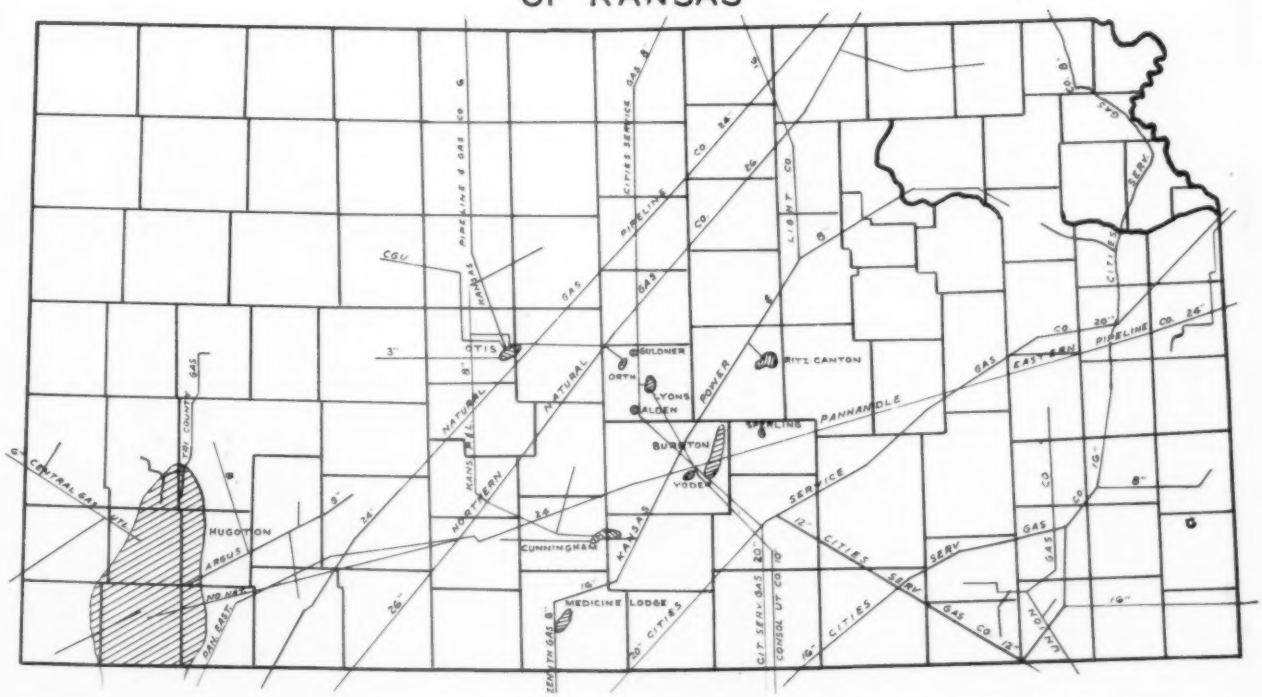
Eastern Kansas

For various reasons the Eastern Area was the first to be developed. This was the portion of the state which was first occupied by settlers; and the gas production was encountered at very shallow depths, making development costs low. Then too, this is an area in which a good grade of limestone and clay shale beds are available at the surface; and these have been widely developed in the manufacture of Portland Cement, building brick and tile. The great lead and zinc ore deposits of the Tri-State District of Kansas, Oklahoma and Missouri are immediately adjacent, and for many years natural gas has been used in the smelting of these ores. It is an interesting fact that the lead and zinc ores of the Tri-State Area occur in the upper portion of the "Mississippi Lime" formation, which is one of the principal gas producing horizons and is only 75 miles to the west of where the ore deposits are mined. The widespread occurrence of natural gas in this area has made Southeast Kansas the principal industrial center of the state. It would be difficult to estimate the number of gas wells completed in Eastern Kansas up to the present time. It is probably somewhere between 15,000 and 20,000, and several thousand of these are still producing. Gas is encountered at depths ranging from less than 100 feet to about 1800 feet, the majority of the wells being from 800 to 1200 feet deep. Production is found in shale, coal, sandstone and limestone; and producing horizons occur in beds of Ordovician, Mississippian, Pennsylvanian and Permian age. Most of the gas however has been produced from what is commonly called the Bartlesville Sand, which occurs as lenses in the Cherokee Shale, of Pennsylvanian age. In large areas of Eastern Kansas gas is encountered in black carbonaceous shales, the most prevalent of these being that found in conjunction with the Oswego Lime. Development of this shale gas reached a peak in 1928 and there is still some activity in its development, although producers have learned that the supply is not everlasting, as was the popular belief for some time.

The development of Southeast Kansas into the industrial area of the state was due primarily to the fact that a large supply of natural gas was available, but owing to the present depletion of its local reserves it has been necessary for some years past to bring gas into this region from other fields. The demand which cannot be supplied by local gas is now taken care of with gas from Western Kansas, Oklahoma and Texas. Kansas reached its peak production in 1908, long before the discovery of any of the fields in the western portion of the state; and as the shallow fields were depleted pipe lines were constructed into the industrial area, which brought gas in from Oklahoma and later from Texas. Had the large West Kansas fields been discovered at that time, it would never have been necessary to import a cubic foot of gas from outside of the state.

Eastern Kansas is now in its last stages of gas development; and although wells as large as 90 million cubic feet in open flow were once encountered, at present a 3 million cubic foot well is unusual. Many wells have been producing commercially for over 30 years, but these are all quite small in size at present. There is probably a reserve in this part of the state of something like one hundred billion cubic feet.

MAJOR GAS FIELDS AND NATURAL GAS TRUNK PIPELINES OF KANSAS



The producing sands of Eastern Kansas are usually lenticular in character, grading out at the edges into shales, with little or no water present. Owing to these facts and to their location near the larger gas markets, they make ideal natural gas storage reservoirs; and several such reservoirs are now being used. During the summer months gas from distant fields is injected into the depleted sands, thus creating a ready reserve which is used in taking care of peak loads during the winter months. Thus the gas company can better serve its nearby markets, and can also furnish the producer with a steadier market at the points where the gas originates.

Western Kansas

All of the oil and gas development in Western Kansas has taken place since the year 1920, when gas was discovered in Stevens County. Three years later, in 1923, oil was discovered in Russell County. In 1888 a shallow gas well was drilled in Rice County, but it produced for only a short time; and it was 36 years later, in 1924, when the first oil pool was discovered in this county.

As in most states, the discovery of the Western Kansas gas fields was incidental to the search for oil; and nearly all of the major gas pools have been found in this manner. At present there are six principal gas fields, as follows:

Burrton, in Reno and Harvey Counties.

Cunningham, in Kingman and Pratt Counties.

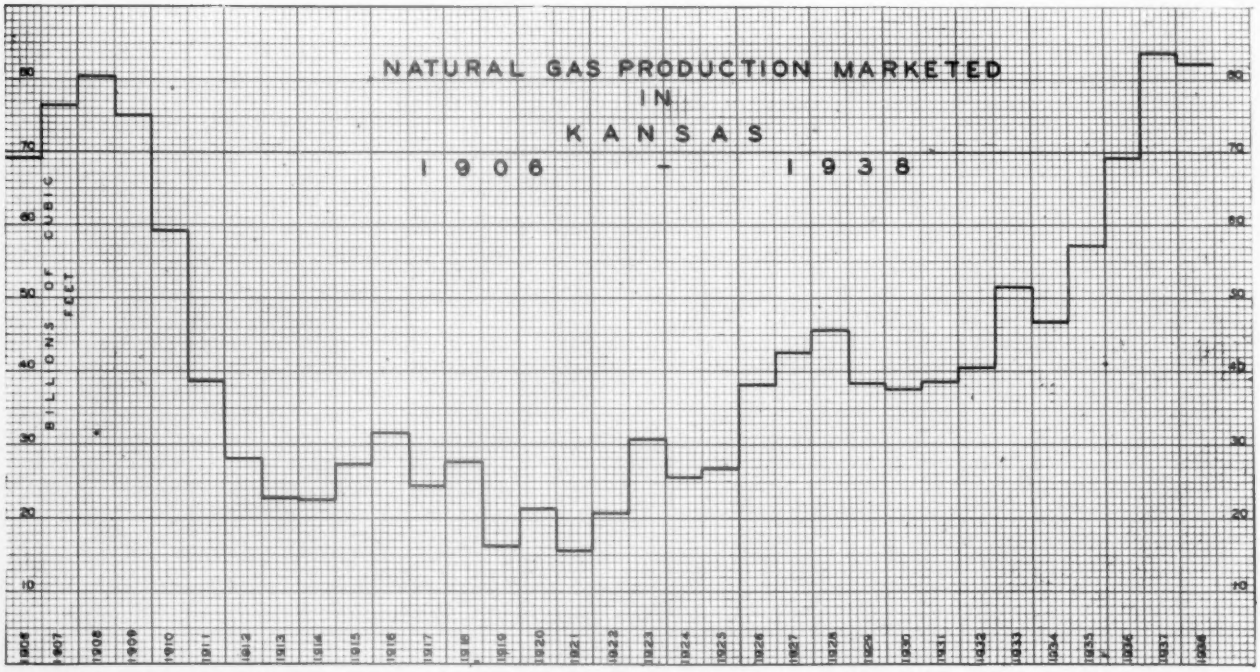
Hugoton, which covers parts of Morton, Stevens, Seward, Grant, Haskell, Finney and Kearney Counties in Kansas, and extends across Texas County, Oklahoma, and probably on into the Panhandle of Texas.

Medicine Lodge, in Barber County.

McPherson County's various gas pools.

Otis, in Rush and Barton Counties.

CITIES SERVICE GAS CO. COMPRESSOR STATION AT WICHITA.



Below is a summary of various data on these pools:

Burrton

Burrton Field discovered in 1931. 330 combination oil and gas wells. Producing from "Mississippi Lime" at depth of 3300 feet. Spacing plan originally was one well to 40 acres, now one well to 10 acres. Pool covers 13,000 acres. Estimated reserve is 70 billion cubic feet. Gas run by Cities Service Gas Co., Drillers Gas Co., Salt City Gas Co., Drillers Production Co., and McPherson Oil and Gas Development Co.

Cunningham

Cunningham Field discovered in 1931. 10 wells at present. Spacing plan, one well to 160 acres. Producing from Viola Lime at depth of 4100 feet. Estimated production to date 700,000 MCF (deep gas only). Present open flow 387 million cubic feet and rock pressure 1350 pounds. Estimated area of pool 9600 acres. 1938 production marketed, 185,000 MCF. Estimated reserve 150 billion cubic feet. Gas run by Kansas Power and Light Company.

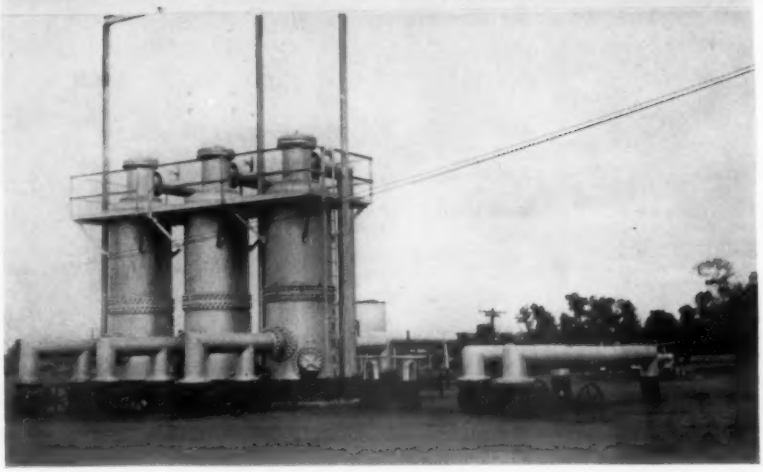
Hugoton

Hugoton Field discovered in 1920. 274 wells at present, producing from Permian Lime and Dolomite at an average depth of 2700 feet. Estimated pipe line runs to date 153,000,000,000 cubic feet. 1938 pipe line runs, 26,659,000,000 cubic feet. Present open flow is 1,991,000,000 cubic feet, and average rock pressure is 414 pounds. This pressure does not represent the average pressure of the field, of which only a small percent is developed. Estimated area of pool is 1,380,000 acres. Estimated reserves 13,716 billion cubic feet.

Medicine Lodge

Medicine Lodge Field discovered in 1927. Present number of wells, 27. Spacing plan, one well to 160 acres. Production found in "Mississippi Lime" at depths of 4400-4600 feet. Estimated production to date 31 billion cubic feet. Present open flow 237 million cubic feet, and average rock pressure, 666 pounds. Estimated area of pool, 6000 acres.

PANHANDLE EASTERN PIPE LINE CO. LIBERAL COMPRESSOR STATION. MAIN ENGINE ROOM, COMPRESSOR END OF TEN 1,000 H. P. COOPER-BESSEMER UNITS.



HIGH AND LOW PRESSURE ABSORBERS CITIES SERVICE OIL CO., WICHITA GASOLINE PLANT.

SCRUBBER INSTALLATION CITIES SERVICE GAS CO., AT WICHITA, KANSAS.

1938 production 4,994,751 MCF. Gas marketed through pipe lines of Zenith Gas System and Kansas Power and Light Company.

McPherson

McPherson County's fields discovered in 1926. Production in several pools, principally from "Mississippi Lime" at a depth of about 3100 feet. Present fields are about drilled up and most of the gas is produced from combination oil and gas wells. Estimated reserve, 100 billion cubic feet.

Otis

Otis Field discovered in 1930. Present number of wells, 57. Spacing plan, one well to 160 acres. Producing from Reagan Sand at depth of 3550 feet. Estimated production to date 57 billion cubic feet. Present open flow 1,743 million cubic feet, and rock pressure 810 pounds. Estimated area covered by pool is 19,800 acres. Estimated reserve, 150 billion cubic feet. Gas run by Northern Natural Gas Co., Producers Gas Co., Central Gas Utilities Co., Kansas Power and Light Co., and Kansas Pipe Line and Gas Co.

The vast size and huge reserves of the Hugoton Field so dwarf the other gas pools of the state that it deserves special mention when considering the natural gas reserves of Kansas. This field was discovered in 1920, development came very slowly at first and it is only during the last nine years that the field has reached major importance. At present there are ten pipe lines and gas companies purchasing gas within the field. These are the Panhandle Eastern Pipe Line Co., Northern Natural Gas Co., Argus Pipe Line Co., Republic Natural Gas Co., Central Gas Utilities Co., Liberal Gas Co., Tri-County Gas Co., United Producing Co., Inc., Columbian Fuel Corporation, and Peerless Carbon Black Co. Gas from Hugoton is sold at points as far distant as Detroit, Michigan, and St. Paul, Minnesota. Several additional pipe lines are at present under consideration which may provide further market outlets.

The Hugoton Field is located in the southwest corner of the state, and at present seems to occupy an area about 70 miles long and 40 miles wide at the widest point. It is not yet defined, and no dry holes have been drilled within the present limits of the field. Wells vary in size from about one million cubic feet open flow to thirty-five million. The pay formation is a sandy limestone and dolomite which reacts very favorably to the use of acid, it not being unusual to increase the open flow of individual wells as much as 500 percent by its use. Structurally the field lies on an eastward dipping monocline, and gas accumulation appears to be due to porosity within the reservoir beds. There is no bottom or edge water present, and for this reason there will undoubtedly be a very low abandonment pressure. The gas is found in several different zones within the producing horizon, these being distributed through a vertical thickness of as much as 400 feet. The average heating value of the gas is about 1025

A sulphur treating plant of Northern Natural Gas Co., located in Otis Field.

B.T.U. per cubic foot, and the gasoline content is reported to be about one-half gallon per thousand cubic feet. The gas is uniformly sweet, no hydrogen sulphide being present.

Gasoline is extracted from most of the gas produced by gasoline plants of the Northern Natural Gas Company and Panhandle Eastern Pipe Line Company. The only carbon black plant in Kansas is located in this field and it consumes about three million cubic feet of gas per day in the manufacture of a high grade carbon black.

Another view of Northern Natural Gas Co. sulphur treating plant, Otis Field.

During the year of 1938 the entire field produced and marketed a total of 26,659,000 MCF of gas. With a reserve of 13,176,000,000 MCF it could supply this market for nearly 500 years. However, it is anticipated that additional natural gas markets will be developed, and it is hoped that the takes from the field will be increased as time goes on.

Compared to many states, Kansas has had very little wastage of natural gas. The Conservation Division of the State Corporation Commission is charged with the duty of preventing avoidable waste and issues production schedules which are to be adhered to by purchasers in certain pools. These schedules are not for the purpose of restricting the production of any pool, but merely for the purpose of insuring that each producer gets his share of what market exists for the pool. These schedules are prepared in accordance with ratable taking orders issued by the Commission.

Natural gas is being used for repressuring purposes in a great many of the old, partially depleted oil pools in the eastern part of the state; and results up to date have been very favorable. It is anticipated that the use of natural gas for this purpose will increase, as there are a great many oil pools yet remaining to be repressured and there is no question but what the use of gas for this purpose will pay the operators well in increased oil production.

One major pressure maintenance project is being carried out in Western Kansas. This is the Cunningham Oil Pool, which produces gas from the Admire Shale and Viola Lime, and oil and gas from the Lansing-Kansas City Lime. Up to date one company, the Skelly Oil Company, owns all the developed oil production, making unitizing agreements unnecessary. This company has been injecting gas into the oil "pay" almost since the discovery of the pool. Nearly all the oil wells are still flowing their allowables, and it is reported that total oil recovery will be much greater than it would have been without pressure maintenance. Projects such as this, result in true conservation of natural gas, and it is anticipated that more such projects will be inaugurated in the future.

Of the 105 counties which make up the State of Kansas, some 51 have proven to be productive of natural gas in commercial quantities. As the search for oil continues, there will undoubtedly be many more gas pools discovered, as there is no reason to believe that any county in the state may not have undeveloped gas reserves. There are at present a great many small gas fields having from one to ten wells in them, and some of these pools may develop into major proportions as development is continued. What the state needs as present is more market outlet for its fields as its supply is far greater than its present market. The 1939 State Legislature has made an appropriation for the purpose of securing additional industries for the State, and the vast supply of cheap fuel which is ready and waiting to be put to use should do much to encourage the locating of new industries in Kansas.

The state reached a peak production in the year 1908 and then declined to a low point in 1921. Since that year, production has been on the up-grade again; and in 1937 it reached a new peak, which it is anticipated the present year's production will surpass. With total reserves of approximately 14 trillion cubic feet, a market of 100 billion feet per year could be supplied for 140 years. The State of Kansas is therefore in a position where it welcomes the industries which seek a supply of the world's best industrial fuel with the promise that there is a plentiful supply within the borders of the state, and that it will unquestionably last for many years to come.

Panhandle Eastern Pipe Line Revenues Rise

Consolidated gross revenues of the Panhandle Eastern Pipe Line Company and subsidiaries for the twelve months ended March 31, 1939, were $10,730,125, as compared with $9,705,023 in the preceding twelve months. Gross revenue in the first quarter of 1939 showed an increase of more than 30 per cent over the first quarter of 1938. These figures were made public by J. D. Creveling, president, who also announced that directors had declared an initial quarterly dividend of 50 cents per share on the company's common stock, payable May 4 to stockholders of record April 19.

Public Service Co. of Indiana Re-elects Directors

All directors of the Public Service Company of Indiana were re-elected April 3rd at the annual stockholders' meeting held at the company's general offices in Indianapolis.

The directors are Robert A. Gallagher, David P. Pardee and Garland J. Oglebay, all of Indianapolis; G. O. Nicolai, Terre Haute; K. F. Dickinson, Lafayette, and Laurence K. Callahan and Stuart J. Barrett, both of Chicago.

P. S. Young Elected Director A.G.A.

Percy S. Young, vice-president, Public Service Electric & Gas Co., Newark, N. J., has been elected a director of the American Gas Association. Mr. Young formerly served as president of the association and has been an active worker on many of its committees since the association was organized in 1919.

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PIPE COUPLINGS

Ontario Natural Gas Industry

By

Victor Lauriston

Chatham, Ont.

THE history of the natural gas industry in Ontario divides itself roughly into three epochs. First, from 1889 to 1918, came the lavish experimental period, when neither the operators nor the public realized the possibilities or the limitations of natural gas. Second, from 1918 to 1924 ensued a period of difficult and rather painful readjustment. Finally, there have followed fifteen years in which the industry has been rebuilt on a solid basis.

Natural gas in Ontario this year marks its fiftieth anniversary. Though restricted by nature to a few southwestern Ontario counties, the industry has grown from small beginnings till today it ranks third among the mining industries of Ontario, being exceeded in importance only by the gold and copper-nickel industries.

Yet it is singular and worth noting that at the moment of writing, the two men responsible, to a greater degree than any of their confreres, for bringing the natural gas industry into existence are still living and active.

Discovery of Oil and Gas in Canada

Canadian oil operators claim, with a goodly measure of pride, that the first commercial discovery of free oil in Ontario—the J. H. Williams well in 1857 at Oil Springs—antedated by two years the more famous Drake well in Pennsylvania.

Williams' discovery led to widespread drilling which brought into existence a number of shallow oil pools—among the most important Oil Springs, Petrolia and Bothwell—which are still producing.

The more important shallow oil pools were all opened before 1866; and there can be no doubt that, in drilling for oil, substantial quantities of gas were encountered. Yet no attempt seems to have been made to utilize the product.

In 1885, however, the Port Colborne Gas, Light & Fuel Co., with C. McNeal as president, drilled for gas in the town of Port Colborne, in the Niagara peninsula. The Port Colborne well developed 25,000 cu. ft. a day, sufficient to light an hotel and a few stores. This was the first commercial use of natural gas in Canada; but, financially, the venture proved a failure. In 1888 a deep well at Thorold got a little gas in the Trenton limestone—also a failure.

It was, however, in that same year, 1888, that Denis A. and Eugene Coste came on the scene. They were sons of a French engineer, Napoleon A. Coste, who worked with the famous De Lesseps at Suez and Panama, and later settled at Amherstburg on the Detroit river. D. A. Coste entered newspaper work, and Eugene studied engineering at Paris; later the two joined hands in the drilling of Coste No. 1 well in Essex county, midway between Leamington and Ruthven.

On January 23, 1889—forever memorable as the real birthdate of the Ontario natural gas industry—Coste No. 1 blew into spectacular production with an initial open flow of 10,000,000 cu. ft. a day and 420 pounds rock pressure. The historic location was Lot 7, Concession 1, Gosfield Township, and production was encountered at 1,031 feet depth.

In May of the same year the Coste brothers started drilling in the Niagara peninsula, on Lot 35, Concession 3, Bertie Township some seven miles east of Port Colborne. The following August the well got production in the White Medina sandstone at 836 feet, with 1,700,000 cu. ft. open flow and 525 pounds rock pressure.

Following these discoveries, development rushed apace in both the Essex and Niagara fields. In Essex the Coste interests organized the Ontario Natural Gas Co., and other rival enterprises shared the development. At first the gas was marketed

Laying pipe line in western Ontario.

to nearby small towns; but in 1894 an 8-inch pipe line was laid to supply Windsor, Walkerville and Sandwich. A year later gas was piped under the Detroit river to Detroit, and for a while it was supplied through a disused line to Toledo. In 1901 the United Gas and Oil Co. of Toronto, an amalgamation of several earlier ventures, pretty well controlled the field.

By that time, the heavy pull on the field had resulted in water intrusion. Essex consumers petitioned the government to prohibit gas export. This was accomplished by revoking the "license of occupation" which had permitted the laying of a pipe line in the Detroit river bed. But this action came too late to save the field. By 1904, even the Canadian communities on the Detroit river were cut off, and that same year marked the definite abandonment of the field. Between February, 1895 and July 1901, the Essex field had exported to Detroit 9,639,355,600 cu. ft. of gas.

The Niagara Field

Meanwhile, the Coste interests in the Niagara area had organized the

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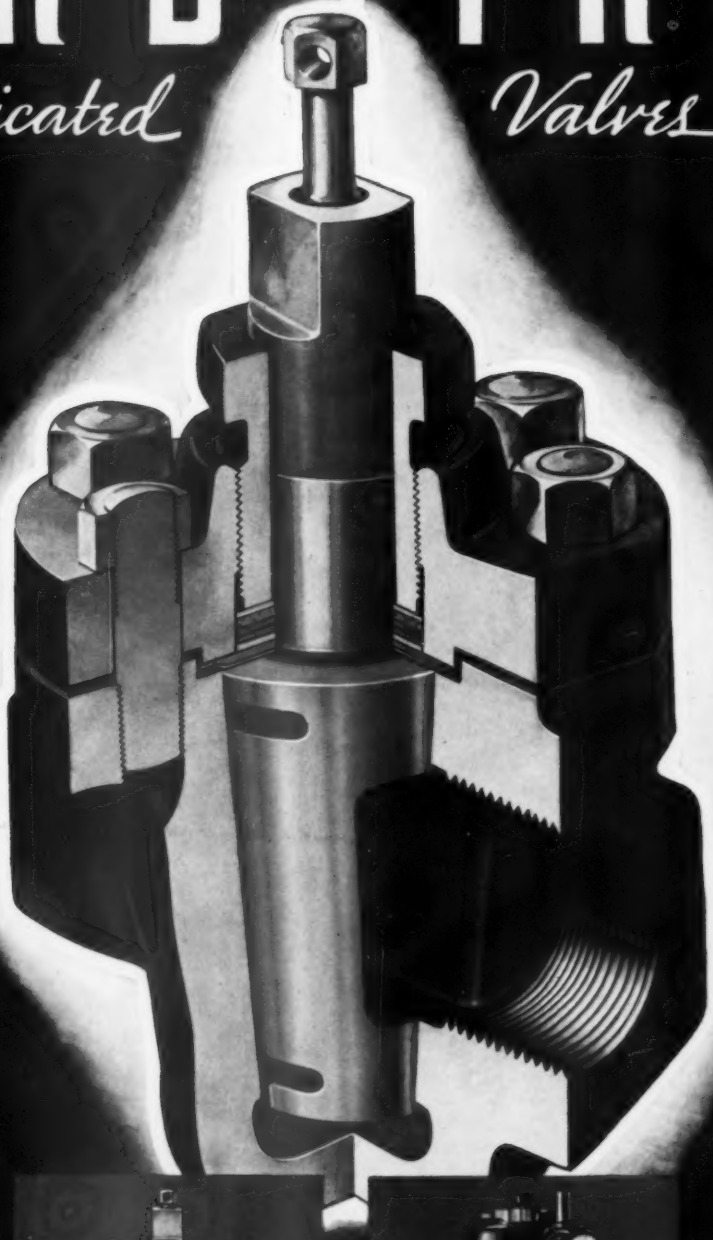

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STEAM JACKETED TYPES—To provide for the external heating of valves, Nordstrom manufactures steam jacketed plug valves. This type is particularly essential in the production of sulphur from wells and transmission of liquids which must be kept heated.

VALVE LOCKING DEVICES—Locking devices are available. Valves can be locked or sealed either open or closed. Desirable on tanks. The device encloses the cover and gland of the valve, preventing tampering.

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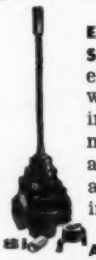
ELECTRICAL REMOTE CONTROL—Electric motor operating units can be furnished for large Nordstroms, for remote control. Also, valves may be equipped with fluid cylinders for operation by means of air, gas, steam, oil or water.



EXTENSIONS for UNDERGROUND SERVICE—High and low head extensions are provided for use with wrench-operated valves installed underground, to permit operation and lubrication above ground. Spur gear-operated valves can be enclosed in iron housings and road boxes.

ALLOY METALS—Nordstroms are offered in all approved alloy metals for special services.

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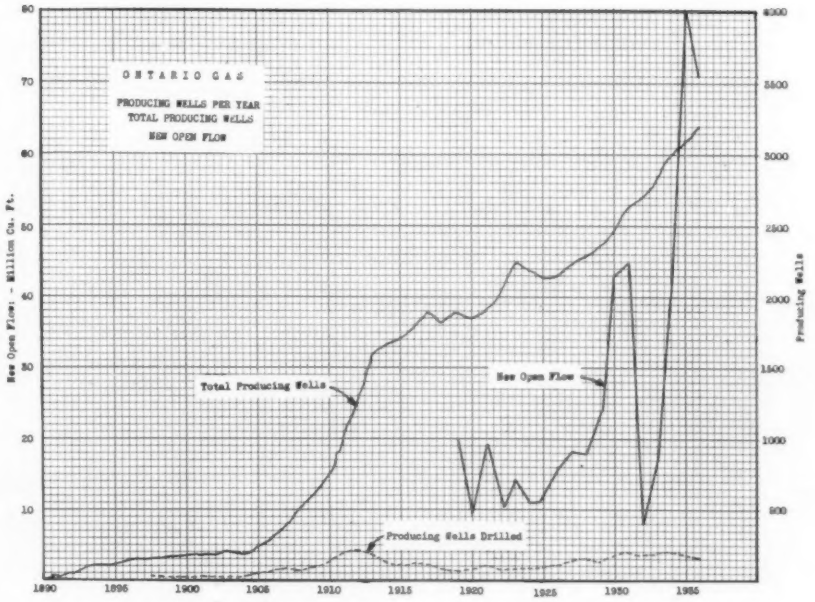


Provincial Natural Gas and Fuel Co. of Ontario, Ltd. In the fall of 1890, with 25 wells completed, an 8-inch pipe line was laid to the Niagara river; and in the ensuing winter gas was sold to Buffalo, the Provincial company at the same time supplying the Canadian village of Bridgeburg. In the fall of 1903, export to Buffalo having been discontinued, the Provincial company laid an 8-inch line to Niagara Falls, Ontario.

In contrast with the tragic experience of the Essex field, the old Niagara field was carefully and intelligently handled: with the result that, after half a century, the Provincial Natural Gas and Fuel Co.—helped out by some small imports of mixed gas from Buffalo—is still maintaining adequate service. For this, much of the credit is undoubtedly due to the inspiration and guidance of the dean of the Ontario natural gas industry, D. A. Coste, who for many years directed the policies of the Provincial company.

Other Early Drilling

From the original Niagara area in Welland county, drilling extended to Haldimand and Norfolk counties. The Haldimand area, with comparatively shallow drilling, has always been marked by the activities of individual operators and small companies. Rapid expansion, however, followed 1905 when the Dominion Natural Gas Co., backed mostly by Pittsburgh men, entered the field and laid a line to Hamilton. In 1906 the Manufacturers Natural Gas Co. contracted gas from a number of producers and also laid a line to deliver the product to Hamilton industries. The original field was extended into Norfolk, Brant and Wentworth counties; and the Dominion company, whose Hamilton activities were restricted to competing in limited areas with manufactured gas supplied by the United Gas and Fuel Co., also secured natural gas franchises in Brantford, Dundas, St. Catharines, Dunnville, Cayuga, Galt, Simcoe, Tillsonburg, Paris and Port Dover and numerous smaller communities along its gradually extended transmission lines.

Western Ontario Fields

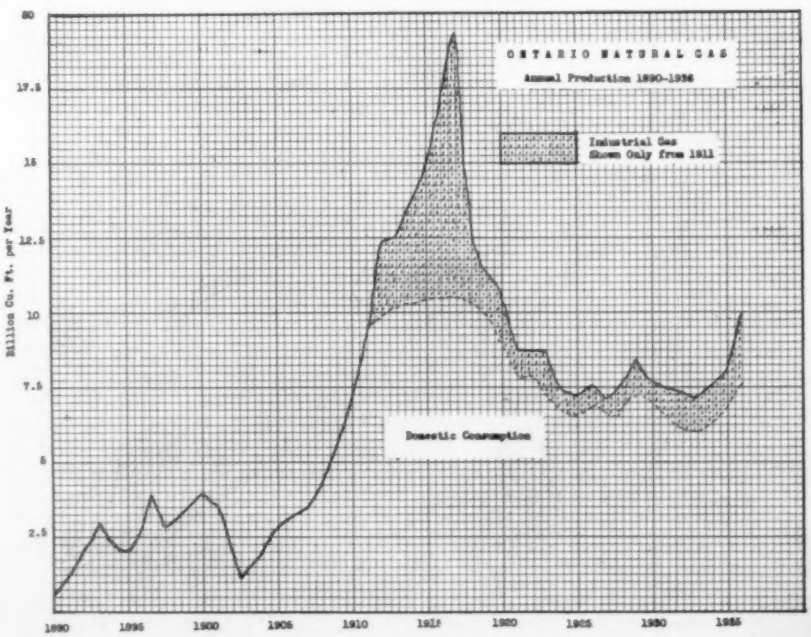
At about the time the Dominion company was starting its operations in the east, the Acme Oil Co. of Detroit in the extreme west was drilling for oil. After two dry holes in Essex, the Acme backers reluctantly undertook a third well farther east, in Kent county—Kerr No. 1, on Lot 10, Middle Road North, Tilbury East Township.

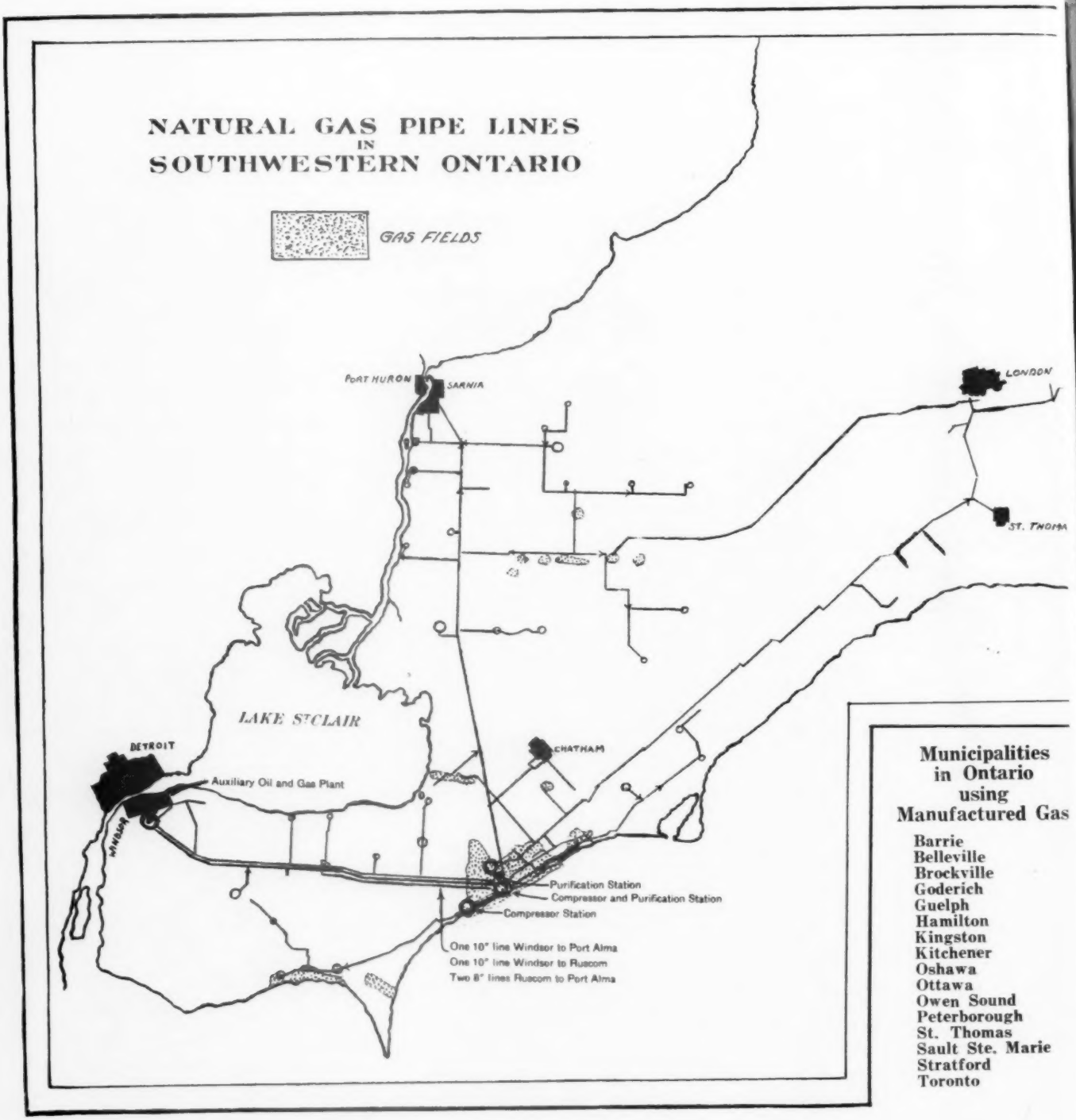
Kerr No. 1 finished in December, 1905, with about 40 bbls. a day and an incidental gas production around 250,000 cu. ft. The well, though small, was enough to start the Tilbury oil boom and bring about widespread drilling that ultimately extended through Tilbury East, Raleigh and Romney townships to Lake Erie.

The Tilbury oil production speedily petered out. Meanwhile, more gas was developed. The operators at first burned it in flares to get rid of it.

In the late summer of 1906 a syndicate backed by Coste Bros. brought in Halliday No. 1 at Fletcher, good for 6,000,000 cu. ft. a day. H. D. Symmes and associates, later incorporated as the Volcanic Oil & Gas Co., laid a 3-inch line to Chatham and in March, 1907, delivered gas from the Tilbury field. The Halliday well later turned to oil; but by that time other gassers could be tied in to the line.

Following the Volcanic venture, there was a rush for natural gas franchises. The Volcanic company enlarged its line to Chatham and in 1909 laid a line to Windsor. The United Fuel Supply Co. piped gas to Sarnia and Petrolia; and the Northern Pipe Line Co. laid a line to Wallaceburg. The Beaver Oil & Gas Co. supplied Leamington and





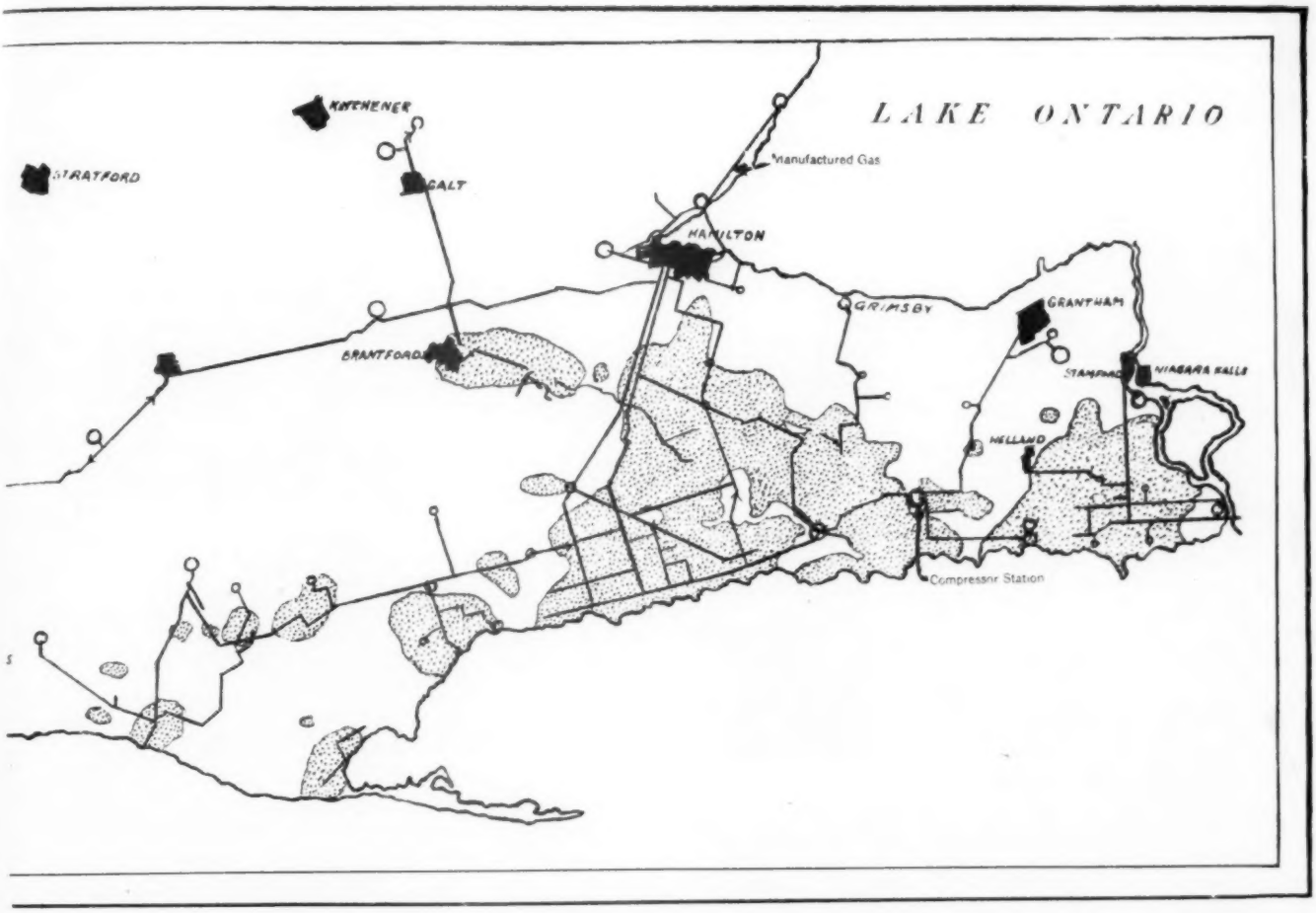
Kingsville; the Volcanic company served Blenheim; and the Ridgetown Fuel Supply Co. took in Ridgetown and Highgate. Within a few years practically every important community in Kent, Essex and Lambton counties was drawing gas from the Tilbury field; pipe was actually purchased for a line to London; and the tremendous immediate and prospective pull on the gas reserves threatened to repeat the tragedy of the Essex field.

To prevent this, ensure orderly marketing and protect the gas reserves, most of the competing companies on January 1, 1912, merged themselves in the Union Natural Gas Co. of Canada, Ltd. In the larger communities — Windsor, Chatham, Sarnia and Petrolia, — the Union company continued, for the time being, to leave distribution to local companies which before 1907 had marketed manufactured gas. In the smaller communities, the Union company handled its own distribution.

The Union merger took in all the Tilbury companies except two—the Beaver Oil and Gas Co., supplying Leamington and Kingsville; and the Maple City Oil & Gas Co., controlling substantial production in the Glenwood portion of the Tilbury field for which it had no market except the small town of Tilbury.

Vienna Field

Midway between the Tilbury and Niagara-Haldimand fields was the small Vienna field, in Elgin county,



opened in 1910, and later extended into the Richmond and Eden areas. The Medina Natural Gas Co., largely instrumental in opening this field, marketed its production through the Central Pipe Line Co. to Vienna and Aylmer; and the Dominion Natural Gas Co. piped some of the gas to Tillsonburg.

Tilbury Field

In 1913 came the first effort to link the prolific Tilbury field, in the west, with the Dominion Natural Gas Co. system, in the east. The newly organized Glenwood Natural Gas Co. secured control of the Maple City Oil & Gas Co. and, with the Beaver Oil & Gas Co., was in turn linked with the Dominion. The latter came under the control of Henry L. Doherty & Co. of New York. Under Doherty auspices, the Southern Ontario Gas Co. constructed a pipe line to deliver gas from the Glenwood area to the Dominion transmission lines in the east; and to facilitate delivery, a compressor plant was built at Glenwood, in the heart of the Tilbury field.

The Union Natural Gas Co., organized a year earlier to control and conserve the field, built a similar compressor plant at Port Alma.

The Effect of the War

The Great War, coming in 1914, completed what this rivalry had begun.

In the development of the Tilbury field, and the competition for natural gas franchises, the operators had quoted low rates, and especially low rates on industrial gas. In most communities, the franchise rates for domestic gas varied from 25 to 35 cents net, with still lower rates for commercial and industrial gas.

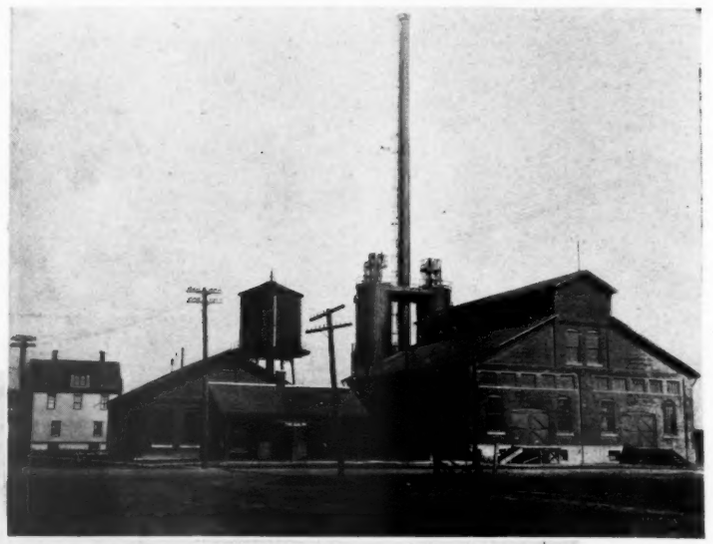
With war industries of many kinds expanding and running overtime, and the price of imported coal increasing, this low priced gas displaced high priced coal, especially under steam boilers. The pull on the Tilbury field, heavy enough with two far-reaching transmission systems drawing gas from the one area, was accentuated by this increased industrial demand.

In the winter of 1917 there were signs of shortage. In 1918, with its bitter cold, consumers found themselves without gas. In response to popular outcry, the Ontario Legislature at a single sitting rushed through the Natural Gas Act, 1918. This measure empowered the Ontario Railway and Municipal Board to deal summarily with the emergency, regardless of franchises and agreements. The board promptly cut off the industrial gas users for the benefit of domestic consumers.

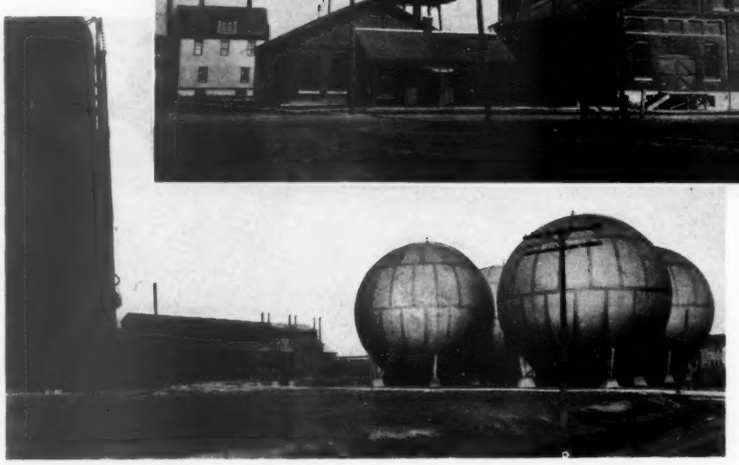
That first natural gas act of 1918 initiated a controversy which, in the next few years, helped to make and unmake governments, and certainly helped to re-make the natural gas industry.

For, with their original marketing basis altered, the natural gas companies sought higher rates for such gas as they were still permitted to sell. Industrial users resented the loss of cheap fuel. Domestic consumers, who had clamored for protection of their gas supply, protested against rate increases. There was much vehement writing and declamation regarding the sanctity of contracts. To harassed governments, it seemed impossible to devise a tribunal or a policy that would satisfy everybody.

The Ontario Railway and Municipal Board gave place to a rate-fixing board of three commissioners, which was in turn superseded by a single Natural Gas Referee. The province enacted conservation and regulatory measures, and appointed



Right: Union Gas Co. purification plant at Port Alma, Ont. Here the Tilbury gas is centrally purified for the entire Union system.



Below: Four Hortonspheres at Windsor, Ontario, provide a reserve of 1,000,000 cu. ft. for peak load demands. The picture also shows stand-by oil gas plant and holder, which, however, is rarely used.

a Natural Gas Commissioner to enforce them. Through all the welter of controversy, realization gradually dawned that the old, lavish days of unlimited gas at low prices could never return: and that the industry must be placed on a new and saner basis if it was to continue.

In June, 1919, a gathering representative of the various companies and individuals connected with the natural gas industry met at London and organized the Natural Gas and Petroleum Association of Canada. This organization did a great deal, in the ensuing years, to bring about a better mutual understanding between rival natural gas interests, and to educate the public—and, especially, to educate the individual natural gas man to the necessity of educating the public. It was the starter which set in motion a great amount of needful missionary work in relation to the industry.

Slowly, recognition dawned that natural gas, even at higher rates, was economical as well as efficient. More efficient gas-using equipment became general. Restrictions on industrial use were eased to permit the use of natural gas in certain economical and essential processes. Higher and more scientific rate schedules were accepted, which, in turn, made it profitable for companies to conserve gas. Conservation measures protected the reserves and eliminated low pressure troubles; and the development of new fields altered the entire outlook.

Below: Modern pipe line practice in western Ontario calls for treatment of pipe and couplings to protect against corrosion, as well as wrapping pipe.

Above: A difficult stretch where a creek bed had to be crossed.

Deep Test Wells

New development had begun to some extent before the crisis of 1918. In 1914, a deep test at Oil Springs encountered large pockets of gas below the shallow oil horizons; and, continuing, developed some gas in the Trenton limestone. This production did not last; but it led, indirectly and after some years, to the opening of a new and more enduring field in Dawn township.

Meanwhile, in 1917, a deep test by the Union Natural Gas Co. in Dover township, Kent county, encountered substantial gas production in the Trenton limestone; and though numerous dry holes were later drilled, the field has yielded a number of good producers.

More important still, about 1924, the De Clute field, today probably the most important producing area in Ontario, was opened in Raleigh Township, Kent county, east of the original Tilbury field.

Within the last few years, a new area has been opened near Brownsville, in the southwest corner of Ox-

CHEMICAL ANALYSES OF ONTARIO GASES

Field	Formation	CH	C H	C H	C H	C H	CO	O	N	He	H S	Spec. Grav.
*Tilbury (pipe Line)	Guelph-Salina	88.32	4.47	1.53	0.59	0.35	....	0.16	4.41	0.17	.....	0.637
Tilbury (center)	Guelph-Salina	91.89	1.36	2.17	0.97	0.38	0.26	....	2.2	0.1	0.67	---
Tilbury (north)	Guelph-Salina	87.65	5.12	1.94	0.82	0.35	....	0.15	3.2	0.11	0.66	0.64
DeClute-Kent	Guelph-Salina	86.68	5.	1.94	0.76	0.47	....	0.32	3.93	0.23	0.67	0.658
Doyles-Kent	Guelph-Salina	85.18	6.45	2.29	0.88	0.47	....	0.61	3.93	0.19	...	0.655
Dawn-Lambton	Guelph-Salina	87.5	4.59	2.	1.41	0.53	....	0.15	3.62	0.2	...	0.656
Brownsville	Guelph-Salina	81.4	4.5	1.6	0.5	0.2	0.5	0.8	9.8	0.28	0.5	0.653
Middleton	Guelph-Salina	84.9	5.4	1.4	0.4	0.2	0.1	0.4	6.31	0.19	0.7	0.647
Dover-Kent	Trenton	88.89	4.97	1.72	0.6	0.42	0.49	0.32	2.42	0.17	...	0.638
Mosa-Middlesex	Grimsby	89.92	3.68	1.96	1.01	0.54	0.17	....	2.42	0.3	...	0.648
* Bayham-Elgin	Clinton	89.07	4.09	1.36	0.59	0.36	....	0.34	3.91	0.28	...	0.644
* Norfolk	Clinton-Medina	82.58	6.41	2.12	0.62	0.25	....	0.54	7.2	0.28	...	0.676
Woodhouse-Norfolk	Clinton-Medina	83.09	5.30	1.73	0.46	0.23	0.29	0.29	8.2	0.41	...	0.658
Rainham-Haldimand	Clinton-Grimsby	89.18	7.42	2.51	0.64	0.29	....	0.33	4.29	0.25	...	0.672
Onondaga-Brant	Clinton-Whirlpool	84.49	4.32	1.55	0.52	0.34	....	0.29	8.15	0.34	...	0.66
Bertie-Welland	Whirlpool	86.07	6.27	1.72	0.59	0.23	....	...	4.86	0.26	...	0.65

*Are pipe line samples; others well samples. The Bertie-Welland sample is from Coste No. 1, drilled in 1889 and still producing.

ford county. This field, gradually extended across the line into Elgin county, gets its production from the Guelph-Niagara formation between 925 and 950 feet. More recently, the Union Gas Co. has secured production in Malahide township, Elgin county, which may mark the opening of yet another field.

Geology of the Producing Area

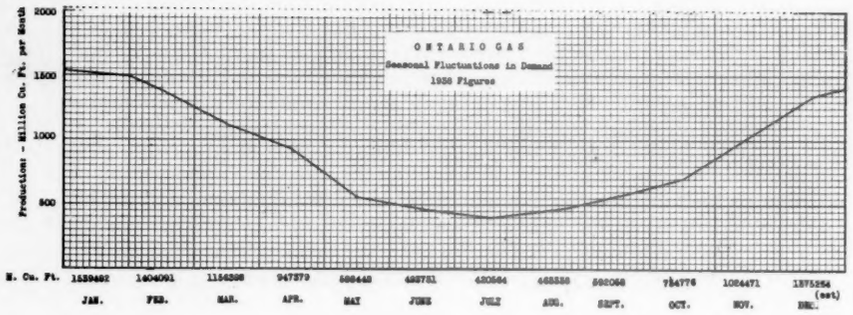
The proven fields extend along the Niagara river and the north shore of Lake Erie. There are large intervening unproductive areas; and at some points the producing areas are a considerable distance inland; but operators have generally believed that the lake shore has a definite relation to natural gas production. Near Port Alma, in Kent county, several wells were drilled off-shore in the bed of the lake, and secured production.

In Ontario, five or six formations have produced oil or gas or both. The corniferous limestone (subdivided into the Delaware and the Onondaga) is the source of shallow

NATURAL GAS PRODUCTION IN ONTARIO, BY FIELDS, 1934, 1935, and 1936. (a)

County	Field	1934	1935	1936
		M cu.ft.	M cu.ft.	M cu.ft.
Essex	Kingsville	4,093,186	4,161,186	3,531,870
	(Tilbury			
	(Declute			1,298,365 (Declute)
Kent	(Dover	563,344	935,446	842,362
Lambton	Dawn and Oil Springs.	517,009	411,944	1,436,919
Elgin	Bayham	51,483	116,118	207,914
Norfolk	Norfolk	354,274	472,993	462,653
Lincoln	Lincoln			
Haldimand	Haldimand	1,801,160	1,576,323	1,735,171
Wentworth	Wentworth			
Brant	Onondaga	109,436	120,461	130,747
Bruce	Amabel	500	400	400
Welland	Welland	318,409	290,119	286,345
Wells in surface drift	Howard and Sarnia	14,000	14,000	14,000
Private wells		60,000	60,000	60,000
Total Produced		7,632,951	8,158,825	10,006,743
Value		$ 4,741,368	$ 4,938,084	$ 6,054,294
Imported mixed gas		102,667	98,848	113,721
Total distributed		7,795,518	8,257,673	10,120,464

(a) Prepared by the Ontario Department of Mines.



oil. Below this the Salina produced some gas as well as oil in Tilbury; and the Guelph-Niagara has been the main gas horizon in the Tilbury, Dawn and Brownsville fields. In the Niagara-Haldimand and Elgin areas the Clinton and Medina formations produce gas; and in Dover the Trenton limestone produces both oil and gas.

The structure is, generally speaking, lowest toward the west and south and gradually rises toward the north and east, with the various horizons outcropping one after another till the Trenton limestone, and beyond that the granite, appear on the surface. Thus, great parts of southwestern Ontario are underlain by all six potential horizons; the number of sedimentary formations diminishing toward the northeast. In general the Trenton limestone, the lowest potential horizon, lies between Lakes Huron, Erie and Ontario and a line drawn from Collingwood to Port Hope; though there are isolated occurrences of sedimentary rocks farther east.

Drilling has been widespread, but many tests have not been carried to conclusive depths, and there are still immense areas practically untested. It is safe to predict that new fields of importance will ultimately be opened, either by drilling in entirely new areas, or by deeper drilling in the older areas.

While new fields are being confidently and systematically sought, the provincial government and the natural gas companies are assiduous in protecting and building up their reserves. For example, the Union Gas Co. has provided at Windsor a standby oil gas plant, as well as four Hortonspheres to maintain a peak load reserve of 1,000,000 cu. ft. of natural gas.

Recent Development of Natural Gas Business

So efficient have been conservation measures, and so satisfactory the development of new reserves, that the industry which in 1918 was thought to be facing imminent extinction has in recent years expanded its activities.

In 1936 the Union Gas Co. laid a transmission line from the Dawn field to London, where it had secured control of the City Gas Co. which previously marketed manufactured gas. The City Gas Co. distribution was remodeled and extended with the introduction of natural gas, and in addition to usual domestic sales, a heavy heating load has been built up.

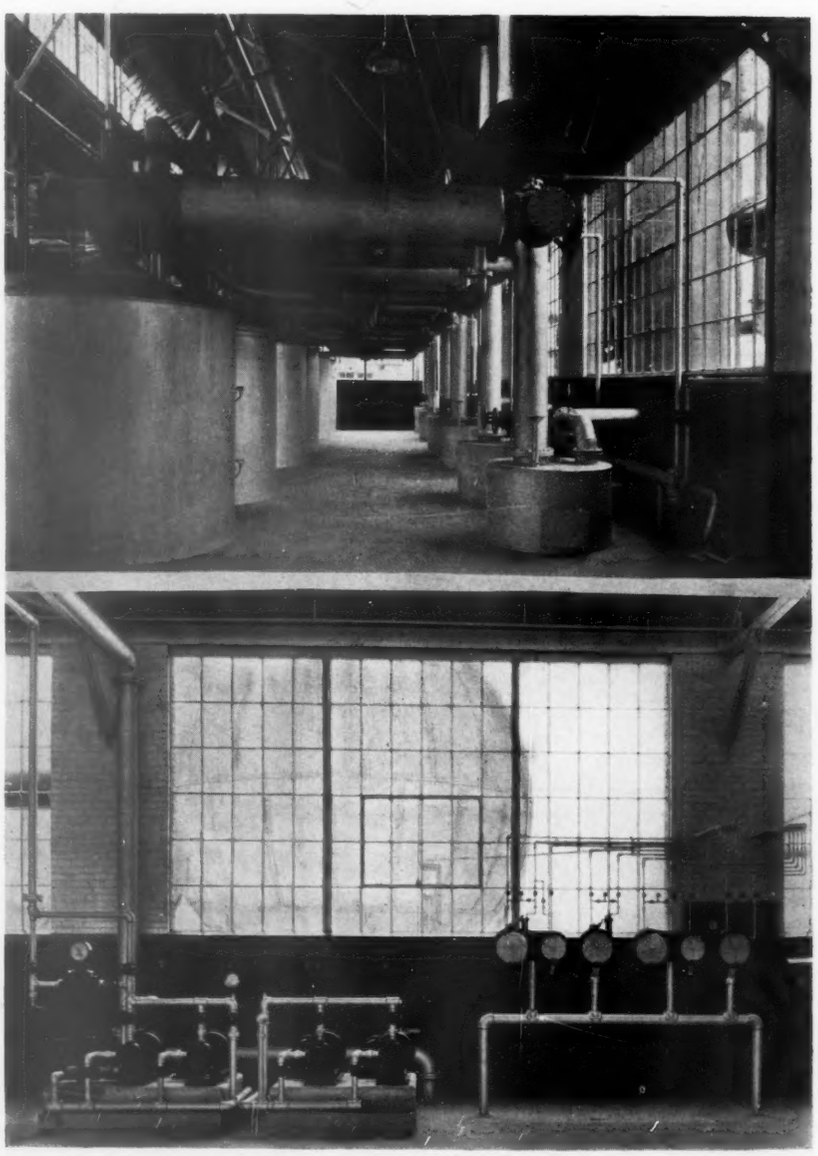
The Dominion Natural Gas Co. has purchased the artificial gas plant at St. Thomas and is now supplying natural gas, chiefly for the lighter domestic purposes for which the artificial product was previously used.

Between 1925 and 1927 the Union Gas Co. acquired the various local companies which had previously handled distribution in Windsor, Sarnia, Chatham and Petrolia. In all these places except Windsor the distribution is now handled in the name of the Union company.

Purification

Experiments in the extraction of

(Continued on page 72)



Above: Interior of Union Gas Co. stand-by oil-gas plant at Windsor, Ont.

Below: Another view showing Hortonsphere outside.

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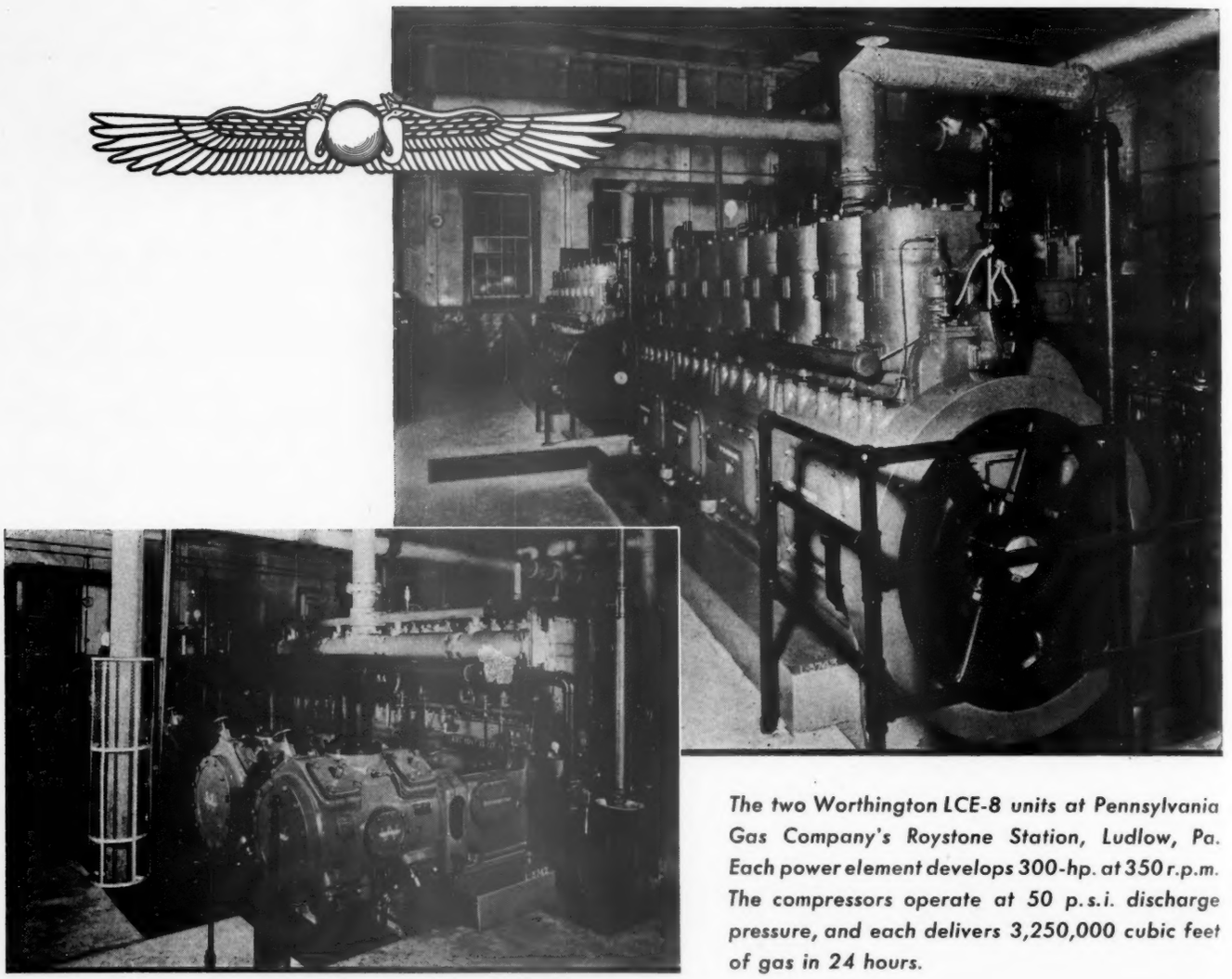

The two Worthington LCE-8 units at Pennsylvania Gas Company's Roystone Station, Ludlow, Pa. Each power element develops 300-hp. at 350 r.p.m. The compressors operate at 50 p.s.i. discharge pressure, and each delivers 3,250,000 cubic feet of gas in 24 hours.

Pennsylvania Gas Company selects Type LCE Worthington Angle Gas Engine Compressors

to modernize and extend its facilities for pumping natural gas to Jamestown, New York, and Erie, Pennsylvania. This recent addition to a fast growing list of Worthington Type LCE installations is but logical recognition of their outstanding features and excellent performance.

Type LCE Compressors are built in units of 75 to 300 horsepower with single or multi-stage compressor cylinders

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What Are We Doing With The Gas Engine?

An Analysis of Data Assembled By The A. G. A. Gas Engine Power Committee

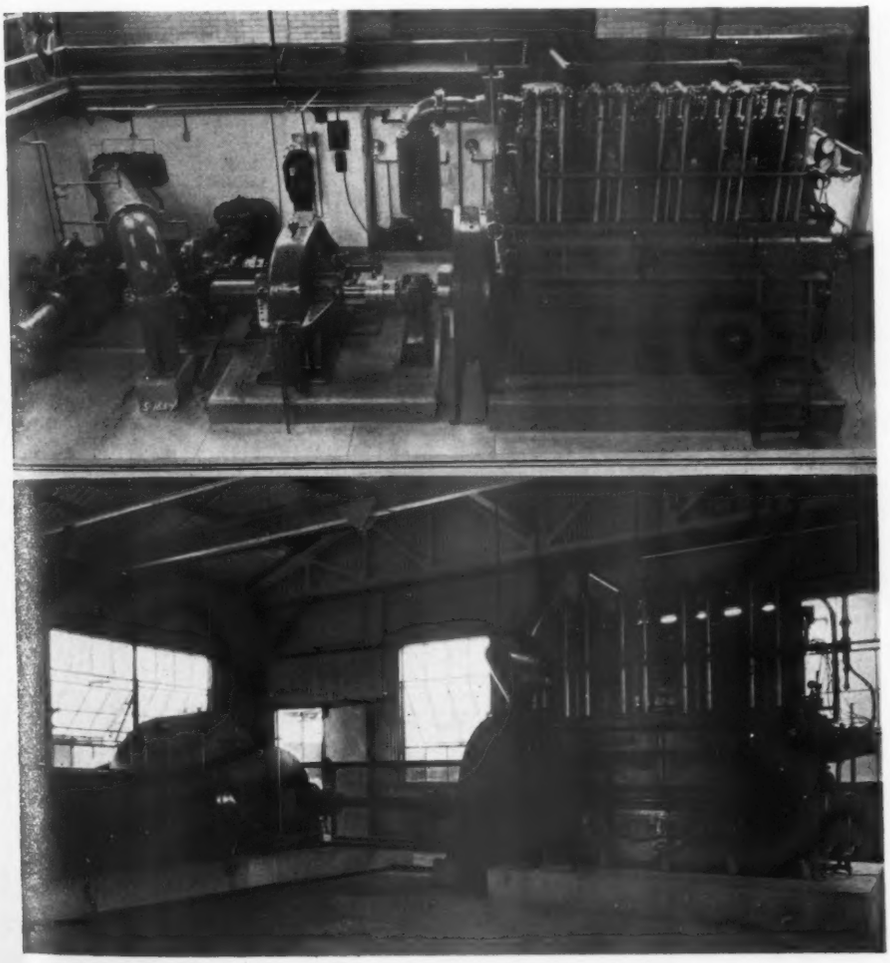
Gas engines compress gas for a Connecticut utility. They are located high on concrete pillars "just in case" of flood.

ALTHOUGH the gas-operated internal combustion engine cannot be classed as a newcomer to the great family of industrial equipment connected to our industry's mains, so much new interest in it as a source of increased non-residential gas load has sprung up in recent years that it is well worth while to review the extent and nature of the market represented by this type of equipment. One can find isolated gas engines which have been fed by metered city gas and loyally turning industrial wheels for as many as 60 years; but if one looks at today's gas engine load as a whole, with particular attention to what has been learned and tried in the past few years, one discovers that perhaps the gas engine is just now beginning to "grow up" as an industrial gas load builder.

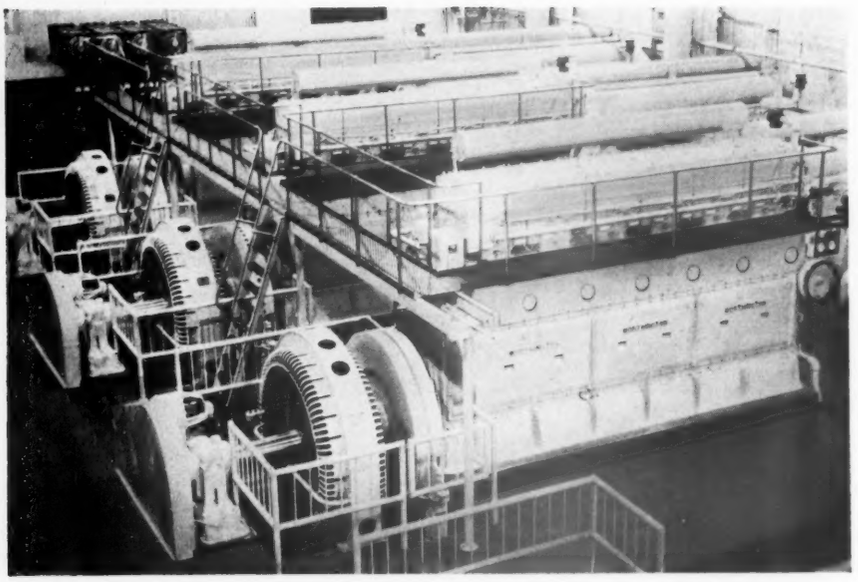
Complete statistics are not available by which we can measure exactly the current size of the gas engine load, but the last report of the Gas Engine Power Committee, Industrial Gas Section, American Gas Association, gives helpful data which may surprise many. For example, it is reported that in Southern California there is used between 400,000 and 500,000 horsepower from internal combustion engines operating on gas fuel. Of this amount almost 100,000 hp. is used in industrial power applications such as operating power machinery, refrigeration, ice manufacture, electric generation, and water pumping for domestic and agricultural uses. In the Southwest the use of gas in internal combustion engines is on an even greater scale. The Oklahoma Natural Gas Company alone has over 27,000 hp. connected for industrial and commercial power purposes. The Lone Star System boasts in excess of 50,000 hp.

But the benefits of gas engine loads are by no means restricted to companies in gas-producing areas. Other gas companies which have received natural gas in the past few years (notably The Peoples Gas Light & Coke Company, Chicago, and Michigan Consolidated Gas Company, Detroit) are profiting by the experience of the older natural gas companies, and are actively developing the gas engine power end of their business. At the same time certain manufactured gas companies are developing this business where the cost of gas production compared with other forms of energy permits the economical operation of gas equipment.

To look at the rate of growth rather than the size of the field is,



Upper: 300 hp. driving centrifugal pumps through speed increaser gear sets in a Kansas water company plant. Lower: In California a direct connected unit operates a hot oil pump in refinery operations.



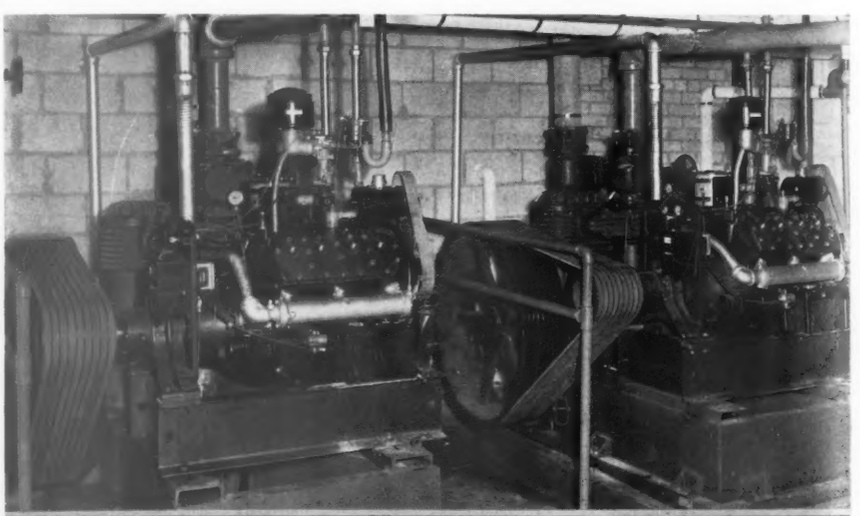
This man-sized job in Oklahoma driving electric generators totals over 2,000 hp. of gas engine. It represents convenience —plus.

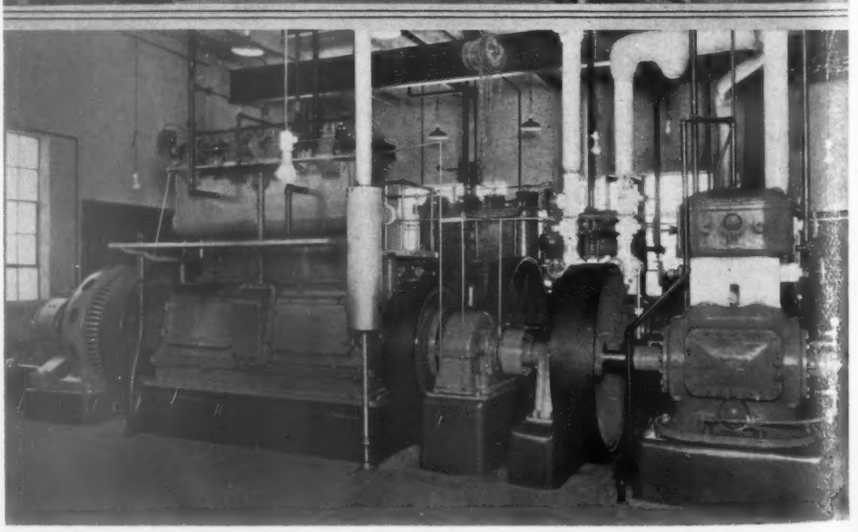
however, the real eye-opener. The above-mentioned A. G. A. Committee quizzed the manufacturers of gas engines and found that in 1937 alone the nine leading companies (and there are 22 of them in the business) sold 524 units as over and against 290 the previous year. In capacity these 524 gas engines totalled 67,257 hp. This means, *in a single year enough gas engines were sold to consume two-thirds of a million* cubic feet of natural gas every hour those engines operate.* Even assuming that as many as two-thirds of these engines were sold to gas or oil companies using their own products as fuel for power generation, and that, therefore, they did not add to our total gas industry revenue, the remaining fraction represents a *sizeable, new lucrative, industrial load to have been connected to customers' meters in a single year.*

With regard to the uses to which this particular 67,257 hp. of gas-developed motive power was put, the records show 68% operating compressors, 10% running electric generators, 15% going for pumping and allied purposes, 5% powering air conditioning equipment and ice plants, and 2% moving cotton gins and cottonseed oil mills. This breakdown is very likely quite representative of the larger national application of gas engine power.

A further idea of the diversity of industrial power jobs which gas engines are doing can be obtained from the photographs shown herewith—all of relatively recent installations. Note the geographical range of the pictured units—from Connecticut to California, and from Lake Michigan to the Gulf of Mexico. Note also the variation in size of jobs being handled.

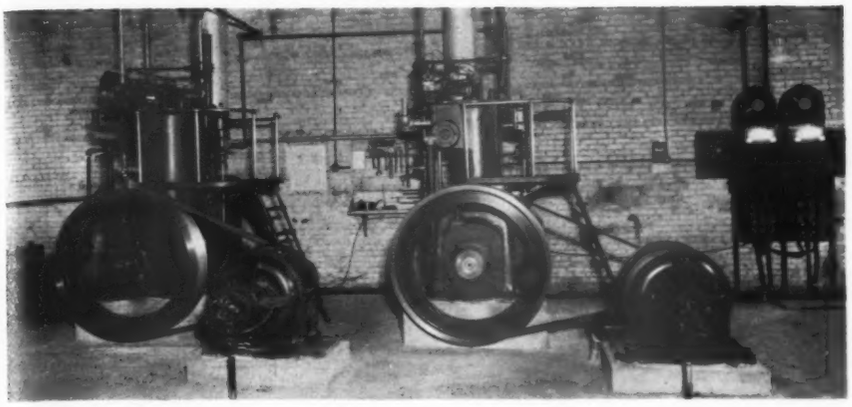
By way of surveying the equipment now available for making gas turn industry's wheels, the Industrial Gas Section of the American Gas Association lists 22 engine manufacturers who offer apparatus designed for gas fuel. Also, many cases can be cited wherein simple adaptations of Ford, Lincoln Zephyr, Chevrolet and other gasoline engines are successfully and profitably installed for operation on natural gas. Even the mail order division of Montgomery Ward is now offering a power unit for natural gas input. The A. G. A. Gas Engine Power Committee further notes that most of the new Diesel engine models are convertible to gas or can be offered for straight gas operation. Here is significant recognition of gas engine power by manufacturers who have previously built straight Diesel





Upper: A Detroit theater-owner saves money by running his air conditioning machine with these two automatic-type gas engines. Lower: Cold storage in this Texas warehouse means two 165 hp. gas engines, hooked up to motivate both ammonia compressors and alternators.

* *Assuming a fair average of 10 cubic feet of natural gas required to develop 1 horsepower.*



All lighting, power, and elevator energy requirements are developed right in the basement of this Georgia department store by two gas engines—and at "a tremendous savings over previous costs of purchased power."

engines. Such units are finding excellent acceptance in territories where: (1) low year-round gas prices prevail and therefore straight Diesel sales are difficult, and (2) low gas prices are available for part of the year (during the off-peak gas season) and gas can be used off-peak and oil on-peak by converting the engine.

Incidental applications of gas engine power, but ones indicative of the ingenuity being exercised in the field, include installations where eight cylinder engines are adapted for air compressors by having only four of the cylinders firing and the other four arranged for compressing air; where the exhaust gases are purified and used as inert gas for maintaining neutral atmospheres in heat treating furnaces or over varnish kettles, and where the excess mechanical power generating capacity of engines at low loads is utilized in the generation and storage of both electrical and heat energy.

The most fertile direction for future advances in the gas engine power field is along the line of waste heat utilization and correct lubrication according to E. P. Kramer, Atlanta (Ga.) Gas Light Co., and leader in the gas engine field. "Some companies are making very satisfactory progress in this connection," says he, "And it has been found that although it is possible to reclaim the 'waste heat' from an internal combustion engine to the extent of 90%, it is usually practicable to reclaim only from 50% to 60% of this heat." Chiefly "waste heat" from gas engines is used for heating water—water to be used either as circulating hot water or as boiler feed water. It has also been shown to be economical to make use of the waste heat in exhaust gases and engine jacket water for heating buildings and factories.

Yes, it is more than likely that the use of gas engines by American industry will expand considerably if the gas industry continues to give careful attention to the potential desirable market such equipment offers, and follows up with aggressive, enlightened, engineering salesmanship.

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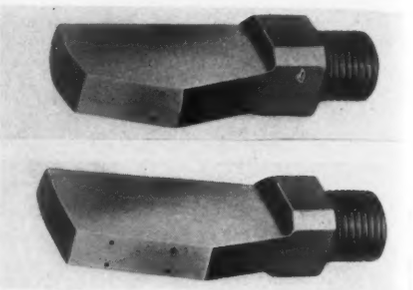
Current Trends in the Multi-Flame Welding And Wrinkle Bending of Overland Pipe Lines*

From Report of the Subcommittee on Construction and Maintenance

By
H. C. Bell
Linde Air Products Company



Four flame tip for pipe diameters below 6" and wall thicknesses less than ¼". Six flame tip for rolling welds on pipe 6" or more in diameter. Small flames are for preheating pipe. One large flame preheats the rod while the other does the actual welding.

DURING the past year three developments of far-reaching importance have resulted not only in speeding the oxy-acetylene welding of pipe in general and of overland pipe lines in particular, but also in producing higher quality welds at lower cost. These are: (1) a new 4-flame tip for bell-hole or position welding; (2) a new 6-flame tip for double-lengthening and for rotating welds; and (3) a new low-alloy steel welding rod which further facilitates the utilization of the advantages attending these multi-flame tips for hand welding. Also, of considerable importance in the fabrication of overland pipe lines is a relatively new method for bending pipe, known as wrinkle bending. Following a discussion of the new tips and rod, this bending procedure will be described in some detail.

Oxy-acetylene welding has been used for many years for joining pipe, and throughout this period there have been constant improvements. In 1931 a technique, now widely employed, was first introduced. This process involved the use of backhand welding, a special flame adjustment, and a special welding rod. Using this technique, welds were made in half the time and at half the cost of methods formerly used.

The advantages of this method of pipe line welding were greatly supplemented by the development, in 1934, of a 3-flame tip, designed especially for making rolling welds. In addition to the main welding flame, this tip had two smaller auxiliary flames positioned so as to preheat the vee directly ahead of the point of welding. Savings of more than 25 per cent in welding rod and gases and of 30 per cent or more in welding time were effected by the use of this multi-flame tip, as compared with single-flame welding.

* Presented for discussion at the Spring Technical Section, Pacific Coast Gas Assn., Los Angeles, March 23 and 24.

Based on the success of the 3-flame tip, the theory of multi-flame distribution of heat in oxy-acetylene welding was well established and an extensive investigation of the possibilities of other multi-flame tips was begun immediately. This investigation, spurred by the recent popularity of the all-bell-hole method of construction, resulted in the development of two new tips—a 4-flame tip for position welds and a 6-flame tip for rolling welds.

A Flame Tips for Position Welding

The 4-flame tip, as the name implies, consists of four separate flames burning from a common head. Two small flames are used for preheating the pipe ahead of the welding puddle, a third flame is used for preheating the rod, while the fourth flame does the actual welding.

This new 4-flame tip adapts multi-flame welding to the making of position welds such as are employed in the popular all-bell-hole method of construction. As no multi-flame tip previously developed had given entirely satisfactory results in position welds, a single-flame tip was generally used. With the one flame doing the work of heating the walls of the pipe ahead of the weld and, at the same time, keeping a puddle of molten metal in the weld, considerable manipulation of the blow pipe was necessary, resulting in less efficient utilization of the available heat.

Distribution of heat is far more efficient with the 4-flame tip. The flames are so proportioned and located that the only movement of the blowpipe required is continually forward, while the rod is manipulated slightly in order to control the height and contour of the deposited weld metal. With the introduction of the new 4-flame tip and welding rod, it is now possible to produce a bell-hole weld in about the same time that it formerly took to make a rolling weld with a 3-flame tip. For example, on 16-in. pipe with ¼ in. wall, an operator can complete a position weld in 8 to 12 min.

No special technique is required when making position welds with the 4-flame tip. Operators proficient in back hand technique will have no difficulty using the 4-flame tip, although they will find it necessary to proceed at a faster rate.

6-Flame Tip for Rolling Welds

The 6-flame tip is similar in design to the 4-flame tip except that it has two additional vee preheat flames. Four flames of this tip preheat the walls of the pipe, a fifth flame preheats the rod, and a sixth flame does the actual welding. Because of the more effective application of heat, the 6-flame tip, as compared with the 3-flame tip, increases the speed on rolling welds by 35 to 70 per cent, depending on the size of the pipe. As compared with single-flame welding, the speed of welding with the 6-flame tip is more than doubled. For example, results from the field show that the 6-flame tip averages somewhat less than 5 min. per weld on 8-in. pipe with ¼ in. wall thickness, and approximately 8 min. per joint on 16-in. diameter pipe with a wall thickness of ¼ in.

New Welding Rod

Another step in the progress of

oxy-acetylene welding of overland pipe lines was the introduction during the past year of a new low-alloy welding rod which develops an average tensile strength of 10,000 to 12,000 lb. per sq. in. greater than rods previously used for pipe welding, yet will give a weld of sufficient ductility to meet any requirements. This new rod was primarily developed for use with the new 4- and 6-flame tips in the welding of high-strength pipe.

In addition to its greater strength, this new rod offers considerable resistance to overheating in the molten state, and solidifies more rapidly than previous rods. This makes it easier to control the welding puddle and considerably increases the rate of welding which in turn effects a reduction in gas consumption per weld.

Welding Speeds

The figures for welding speeds and material consumption shown in tables 1 and 2 are typical of what may be expected on a well-organized pipe line job using the new 4-flame and 6-flame tips.

Small Diameter Pipe

For pipe diameters below 6 in. and for wall thicknesses less than ¼ in., the 4-flame tip should be used for rolling welds, as well as for position welds. The 6-flame tip is not recommended for rolling welds on pipe less than 6 in. in diameter because the rear preheating flames are of little value on pipe of this size.

Casing Welding with Multi-Flame Tips

The same principle of economical distribution of heat in welding pipe for oil, gas, and other lines has been applied to casing welding. By slight modification, multi-flame tips, somewhat similar to the 4-flame tips previously described, have been perfected for making butt welds in casing. With these tips the same relative speed and economy required for casing construction have been obtained for casing welding as for pipe lines.

Wrinkle Bending

Wrinkle bending is a relatively new method for bending pipe which promises considerable economies in the field fabrication of overland pipe lines. This method consists in heating with the oxy-acetylene flame one or more narrow bands at right angles to the pipe and extending about half way around the pipe. The pipe is then bent either by hand or by means of a tractor or bending rig until the heated sections buckle sufficiently to give the pipe the desired curvature.

TABLE 1.—DATA FOR MAKING POSITION WELDS USING THE 4-FLAME TIP

Pipe Diameter, in.	Wall Thickness, in.	Included Angle, deg.	Rod per Weld, lb.	Oxygen Per Weld, cu. ft.	Time Per Weld, min.
6	0.250	60	0.38	8	4
8	0.250	60	0.45	11½	6
8	0.375	50	0.87	16	8
12	0.250	60	0.80	17	9
12	0.312	50	0.90	19	10
16	0.250	60	1.00	21	11
20	0.250	60	1.25	26	13

Note: Acetylene consumption is about 3 per cent more than oxygen.

TABLE 2.—DATA FOR MAKING ROLLING WELDS USING THE 6-FLAME TIP

Pipe Diameter, in.	Wall Thickness, in.	Included Angle, deg.	Rod per Weld, lb.	Oxygen Per Weld, cu. ft.	Time Per Weld, min.
6	0.250	60	0.34	5½	3½
6	0.312	60	0.50	6½	3¾
8	0.250	60	0.44	7	4
8	0.375	60	0.80	12¼	6
10	0.250	60	0.52	8	5¼
10	0.375	60	0.98	16½	8
12	0.250	60	0.65	9½	5½
12	0.375	60	1.08	20½	10
16	0.250	60	0.84	13	7½
16	0.375	60	1.50	24½	12¼

Note: Acetylene consumption is about 3 per cent more than oxygen.

Although wrinkle bending has been known and practiced for over a quarter of a century, it is only recently that its use has become widespread.

Wrinkle bending is analogous to shop-fabricated creased bends, only the wrinkle or crease is not so pronounced. As a rule, each wrinkle is used to produce only a slight change in direction of the pipe. When the bend is more pronounced a series of wrinkles are used to give an easy flow, long sweep bend. The method has found its greatest favor in mountainous country where, obviously, the greatest amount of bending is necessary, and where cold bending is difficult to handle because of the rough terrain and heavy equipment required.

Wrinkle bending is applicable from the smallest to the largest size pipe. Excellent results have been obtained on 4- and 6-in. pipe and equally good results have been obtained on the larger sizes ranging all the way up to 22 in. The method is adaptable to both heavy wall and light wall pipe and can be performed in the shop as easily as it can in the field.

The advantages of wrinkle bending are many. Particularly important is that the pipe wall is never thinned from the original thickness. On the contrary, compression squeezes the pipe so that the metal at the wrinkle is actually slightly thicker than the original wall. The metal on the outside of the bend opposite the wrinkle retains its original thickness because of the very slight angle turned.

Wrinkle bending lends itself readily to correction, since too much bending in one or more wrinkles may be corrected simply by reheating and applying a reverse pull or sag. Furthermore, the pipe is not stressed as in cold bending because the bend takes place only at the point where the steel has been softened by heating. The facility with which bends are formed makes for the ready fabrication of gradual or long sweep bends that are so desirable in overland pipe line construction.

Another important feature of wrinkle bending is its low cost. Equipment costs, labor costs and materials costs are all low. Also, the method permits bending even before the ditch is cut. Wrinkle bending fits in very well with the all-position or stab-on methods of welding.

Large degree bends even up to 180 deg. are readily fabricated by wrinkle bending. These may be made in the shop and then fitted on the job. Pumping station piping equipment is an example of this type of work.

Again, where the terrain is very rough and the pipe size very large, wrinkle bending can be carried out adjacent to the railroad siding where

the pipe is being unloaded. The bent sections are then hauled out by the pipe stringing trucks and placed where needed. This is of special value in composite construction.

Procedure for Small Diameters

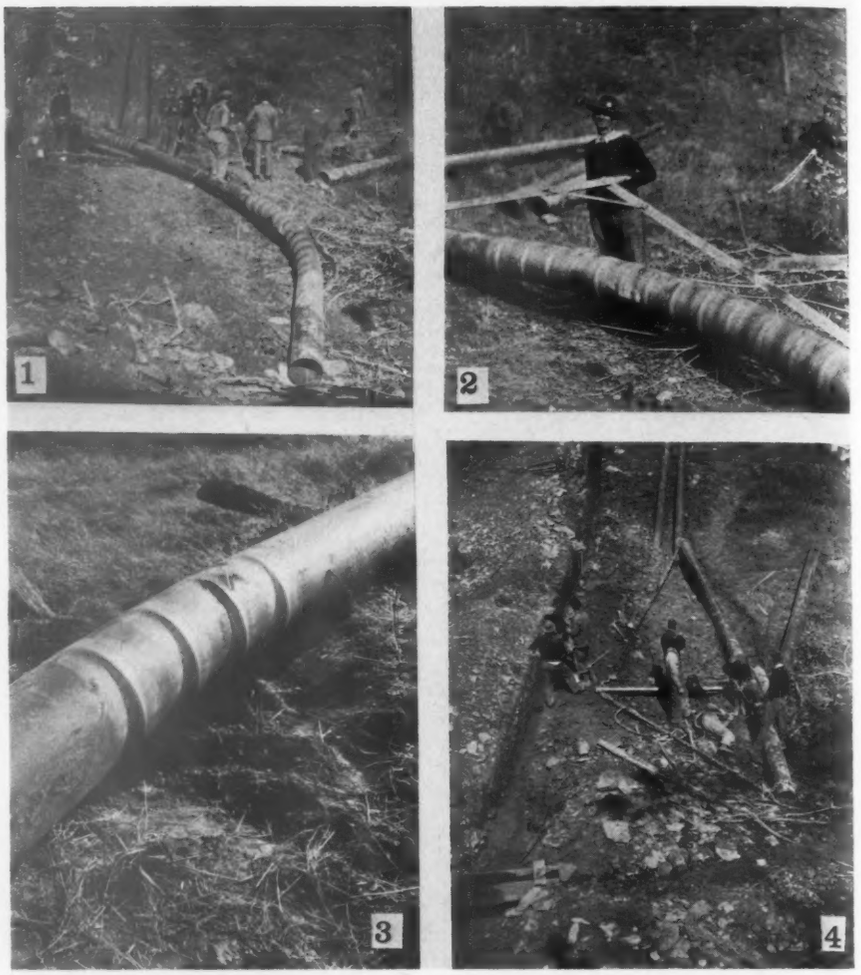
As a rule, only one oxy-acetylene blowpipe is required for pipe under 6 in. The large capacity blowpipes designed for heavy heating operations are particularly suitable for wrinkle bending. Additional equipment consists of either a manifold supply of dissolved acetylene, or an acetylene generator, and a supply of oxygen. Usually, both gases are hauled along the right-of-way on a sled. Trained welding operators are not required, as the process involves only a simple heating operation.

In field fabrication, the bending or laying foreman decides where a bend is necessary. This may be a side bend, sag bend, or overbend. If the pipe is of small diameter, 6-in. for instance, no additional bending equipment is necessary. The section of pipe is laid on skids across the ditch and the foreman marks the point at which the pipe is to be bent. The heaters, standing on each side of the pipe, then proceed to apply heat to this point around approximately one-half to two-thirds of the upper circumference of the pipe. The band of heat should be 2 to 3 in. wide at the top of the pipe and should taper down to zero on the two sides. The pipe should be heated to a bright red.

When the pipe is at the correct temperature, the section should be rolled over quickly so that the heated portion is on the underside. At the same time one of the pipe gang should throw the skid on while one end of the pipe is resting into the ditch. This man should then press, if necessary, on his end of the pipe while the other end is being held securely by two additional men. The weight of the pipe itself is usually sufficient to form the wrinkle, and the man in the ditch often finds his chief work in holding the sagging pipe to the requirements of the bend.

This operation is repeated until sufficient wrinkles have been formed to give the required bend. In general, a wrinkle of 5 to 7 deg. should be the maximum to which the pipe is bent. A greater total bend is obtained by using more wrinkles. Wrinkles may be at any distance from one another depending on the angle of the bend and the diameter of the pipe, although it is more desirable to produce long sweeps wherever possible rather than short angle bends.

The entire procedure should not require more than 2½ to 3 min. All three types of bend—sag, side and overbend—may be readily produced in one section of pipe.



1—Large degree bends even up to 180 degrees are readily fabricated. 2—Long sweeps are preferable to short angle bends. 3—Each wrinkle is used to produce only a slight change in direction of the pipe. 4—One type of bending rig. A stiff leg with a saddle is attached to one end of the pipe by a chain and to the other end by a cable. The cable passes through a pulley and around a winch secured to the stiff leg. When the foreman indicates that the pipe is at the proper bending temperatures, the two men just behind the heater take up on the winch.

Procedure for Large Pipe

Two blowpipes should be used for pipe 6 in. in diameter and over. Also, additional bending equipment is necessary if the pipe is large or lying alongside the ditch or on the ground prior to ditching. A tractor, A-frame or bending rig can be used. If a tractor is used, it should be equipped with a stiff leg. The tractor should run part way onto the timbers which hold the pipe in place, the stiff leg set in position, and the chain block attached. The chain block in turn is fastened to the pipe. The pipe should then be heated in the usual manner with the two blowpipes and, when the proper heat is reached, the free end should be pulled up by means of the chain block.

Another method for handling this type of work is to use a tripod or A-frame equipped with block and tackle. One end of the pipe should be temporarily anchored, the heat applied, and the free end then hoisted to form the wrinkle. Still another method using the same equipment is to hoist the pipe first, place one or two men at one end to steady the pipe, and one or two men at the other end to press down. Heat is then applied on the underside of the section, and the wrinkle is formed by the weight of the sagging pipe.

If the pipe is of the usual low carbon type, the bend can be arrested at any time by sudden cooling with water. However, this practice is not recommended for high strength pipe. In wrinkle bending longitudinally welded seam pipe, the heat should preferably be placed 180 deg. away from the seam.

Where just a small angle is required, the wrinkle need not necessarily extend the full half of the circumference.

Cost of "Carboseal" Anti-Leak Treatment Now Less than Ever

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Leakage Reduction Reports

TEXAS — In October, 1936, "Carboseal" anti-leak was applied to 881 ft. of 4-in. main. The annual unaccounted-for loss was reduced 96 per cent by this treatment. This figure was still the same when checked in March, 1938.

• • •

NEW YORK STATE—In a system consisting of 14.7 miles of 3-in. equivalent low-pressure mains and 4.7 miles of 3-in. equivalent mains carrying 5 to 8 pounds intermediate pressure, the latter were treated with "Carboseal" anti-leak in 1936. The unaccounted-for gas volume was reduced 85.3 per cent by December, 1938—two years after treatment. This reduction was largely due to "Carboseal" anti-leak. The low-pressure mains in this system will be treated this year.

MISSISSIPPI — Shut-in meter tests showed a leakage reduction of 97.5 per cent after "Carboseal" treatment. Soap tests showed that even "blowing" leaks were eliminated.

• • •

ILLINOIS — A utility treated 545 cement joints in 4-in. main with "Carboseal" anti-leak at a total cost of $442.68, or 81.2 cents per joint. The annual leakage per mile of 3-in. equivalent main fell 95.4 per cent.

• • •

GEORGIA — In June, 1936, "Carboseal" anti-leak was applied 6 times in 4 weeks to 44,000 ft. of 4-in. main. Total unaccounted-for gas volume was reduced 60 per cent and bar tests showed elimination of joint leakage. The loss remained the same when metered in June, 1938.

Widespread experience by over 250 users indicates that the cost of "Carboseal" anti-leak required to correct leakage per mile of 3-in. equivalent cast iron main has averaged ninety dollars. *The average cost per joint has been less than seventy-five cents.* With lower prices for "Carboseal" anti-leak, leakage in packed bell-and-spigot joints in dry distribution systems can now be corrected at *even lower cost.*

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Joints treated in this way keep gas where it belongs and remain tight for years. A few actual case histories are reported at the left. Joints treated six years ago are still tight today on the soap test.

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Industrial Gas and the Competitive Angle

Part 3
Fuel Oil Concluded

by
Raymond F. Mann

Wentz-Mann Company
Kenmore, N. Y.

IN the April issue of the JOURNAL we discussed at some length those properties of fuel oil that affect its value for industrial heating, and some of the items of expense associated with its use.

Handling Cost of Oil

Our investigation has shown that the invoice cost of the oil is far from the only cost that must be considered. On the contrary, there are a whole series of additional items of expense that we can group under the general heading of "handling cost." By this we mean such things as demurrage on tank cars, labor for unloading same, losses through sludge or water in the oil, evaporation losses, seepage loss, current to operate oil pumps, maintenance and repairs to motors and pumps, interest on the cost of oil in storage, labor for cleaning storage tanks, cost of steam for heating oil if the heavier grades are used, cost of atomizing oil at the burner, burner upkeep, losses in production through burner clogging, burning out, etc., decreased life of furnace refractories, forced air for combustion, and many other items perhaps individually small but large in the aggregate.

The actual total of such items making up the handling cost varies with the plant, the operation carried on, the grade of oil used, the system of burning the oil, and similar factors. Few plants maintain such complete and detailed records that they have any true realization of this cost. Many items are hidden in general plant operating and maintenance costs, and it is extremely difficult to find the actual amounts chargeable to oil firing. In the writer's own experience, he has found few plants where any attempt was made to evaluate this cost that did not show at least one cent a gallon for these items, and often the figure was nearer 1½ cents per gallon.

One large railroad shop using a high gravity fuel oil in a great variety of furnaces and forges gave us the following analysis, which is copied verbatim from their letterhead paper:—

36°—40°Bé fuel oil. Purchased in tank car loads.

Storage capacity—three 8,000 gallon tanks.		
Average amount in storage—about 10,000 gallons.		
Invoice cost delivered at, per gallon		5.75 cents
Unloading Cost:		
Includes switching tank cars, coupling and uncoupling storage tank pumps, attending to unloading, inspecting for air leaks, etc. $346.15 for 23 cars in 1927 of 141,776 gallons total	.244 cents	
Handling Charge:		
To convey oil from storage tanks to detached forges and furnaces in shop. $1,688.52 per year	1.194 cents	
Interest on Oil in Storage:		
10,000 gallons average amount in storage. 10,000 × (5.75 plus .244) @ 6% divided by 141,776	.025 cents	1.463 cents
Total Oil Cost		7.213 cents

It will be noted that an extremely light fuel oil was used, hence reducing to a minimum many of the items of handling cost such as burner maintenance, and eliminating entirely any cost for preheating the oil. It will also be noted that no estimate was made as to the cost of combustion air. It so happens that high pressure air at 95-100 lbs. pressure was used; and if we turn to the table given last month, we will find that such air costs not less than .567 cents to burn one gallon of oil (that is under the best of conditions and getting a maximum of induced air. Actually in practice the real cost is apt to be much higher). Using this figure, however, the total discovered cost of oil over and beyond the invoice cost becomes 2.03 cents or some 35.3% of the first cost.

Another analysis of fuel oil costs is offered in the table next page. This is given with a certain amount of hesitancy as it has been in the writer's files so long that he is no longer sure of the source and hence can not vouch for its accuracy. The last item "Loss of Production" seems rather large and somewhat open to question but is not impossible. The table is given, therefore, not for the specific figures it contains but rather for its detail in bringing out the many items that should properly be charged to a fuel oil operating system.

In this example all costs chargeable to oil firing have resulted in doubling the original oil cost. Omitting the last two items, furnace maintenance and loss of production, which will, of course, vary widely, from plant to plant the so-called "handling cost" is 1.511 cents a gallon. This is a figure that can quite safely be used in any reasonably large plant using a carload of oil a month and up. Such a figure should be increased by an amount for furnace maintenance and loss of production suitable for the plant in question. The exact magnitude of this additional amount will depend largely on the ability of the industrial gas engineer to observe present conditions

and evaluate the improvement that would follow a change to gas-firing.

Hidden Costs

Most sales whereby gas is successful in replacing another fuel follow as the direct result of a survey, a survey made to acquaint management with the actual cost of operation and form a basis of comparison when gas is later substituted. One of the most important parts of such a survey is to find out these hidden costs. They do exist; and if management is ignorant of that fact and belittles their magnitude, the sale of our fuel is made that much more difficult, if not impossible. It is our job to know these costs and be prepared to back up our statement when we say to the prospect, "Your invoice cost for oil is 5 cents a gallon. That means it is costing you 6 (or 6½ or 7) cents a gallon at the burner." Such a statement generally brings a denial that it could cost that much to move oil through his plant, and you must be prepared to support your statement with cold facts. Proof on your part that oil is costing him more than he realizes is a wonderful stepping stone to a demonstration of the real economy of gas firing.

If the matter of a new plant is involved and costs must be from the ground up, then gas has an extra advantage over fuel oil in that the first cost or investment for an oil system is much greater than for gas. Again it is impossible to give exact figures; but with gas no storage facilities are necessary, no oil pumps, no expensive preheating system, furnaces are less bulky and by the same token less expensive, perhaps even an air blower is unnecessary. All in all the investment is less; and hence interest charges, depreciation, etc., are proportionally lower with gas.

Service

There is still another factor of the utmost importance to many plants to be considered in the comparison of gas and oil. That is the question of service when something goes wrong with a furnace. The assumption is made that the gas company gives free service at least as far as inspection and advice, and that it has a service crew available at all times able to help out in an emergency. If you can say to a plant manager: "Here is your furnace. Take it and run it as we have instructed your men. Our inspector or myself will call periodically and look it over to make sure it is operating efficiently. If anything goes wrong, day or night, call our service department. We have spare

Fuel Oil Cost Analysis on Basis of 220,000 Gallons Annual Consumption in one ..... Plant

	Cost per Gallon Total Per Year	Cents
Invoice cost		3.21
Freight		2.18
Leakage, evaporation and sludge cleaned from tanks, 1,000 gallons per year	$53.90	0.0234
Unloading:		
Two men one hour @ .65 to connect and unload each car for 24 cars	31.20	
Steam for heating 12 cars @ $1.66/M lbs. and 3400 lbs. of steam/car	68.00	.045
Storage:		
Cleaning labor per year 20 hrs. @ .50	10.00	
Interest on cost of 18,000 gallons average amt. in storage. 6% of $970.20	28.21	.031
Pumping:		
Current @ 1.45c/KwH. to operate 10 HP. motor 450 hrs. per month	584.10	
Repairs to pumps average 5 hrs. labor @ .75 and .75 for material	4.50	
Packing for pumps	2.10	
Oiler's time 1 hr./wk. @ .50	26.00	
Steam for heating oil, 2 HP. gas-fired boiler averages 150 cu. ft./hr. @ 88.2c/M.	198.00	
Two 11' x 2½" single leather belts/yr. on pumps	12.00	.394
Burner Expense and Air for Combustion:		
Current @ 1.45c/KwH. to operate 35 HP. blower motor 450 hrs./month	$2,035.80	
Maintenance of blower equipment, oiler's time, oil, waste and repairs at $2.50/HP.	87.50	
Parts to replace 2 complete burners	46.00	
Maintenance of burners 5 hr./wk. @ .75	195.00	1.018
Furnace Maintenance:		
Rebuilding furnaces and combustion chambers average $6,000/yr. in labor and material. This cost can be cut in half with gas because of the destructive action of oil on targets and brick in the furnace. Thus $3,000/yr. chargeable to oil	$3,000.00	1.363
Loss of Production:		
Production cost by stoppage of oil lines, water, or dirt causing burners to go out. Interruption of production due to furnace repairs. Production loss due to inaccurate control. Gas can not eliminate but can materially reduce loss of production through a constant supply of uniform fuel, less frequent furnace repairs, and accurate temperature control. The value of production lost must be estimated on the value of the finished product.		
Estimated saving in production on gas	$5,000.00	2.272

Summary

Invoice cost	3.21	cents/gallon
Freight	2.18	
First cost	5.39	
Leakage, Evaporation and Sludge	0.0234	
Unloading	0.045	
Storage	0.031	
Pumping	0.394	
Burner Expense	1.018	
Furnace Maintenance	1.363	
Handling Cost	2.8744	
Loss of Production	2.272	
Total Cost	10.5364	cents/gallon

	Operation	*Type of Oven*	*Size of Oven*	*Gas Burner Equipment*	*Temp.*	*Btu Replacement*
1.	Core Baking	Continuous	Oil 52′ x 19′ x 7′ Gas 74′ x 18′ x 7′	Air Heater. Low Pressure Insp.	450°F.	1.81
2.	Core Baking	Car Overnight	16′9″ x 8′6″ x 7′2″	Lava Tip. High Pressure	375	2.03
3.	Core Baking	Car	5—15′2″ x 10′6″ x 8′	Lava Tip. High Pressure	475	1.97
4.	Mould Drying	Car	31′ x 8′ x 10′	Atmospheric Drilled Pipe	450	1.79
5.	Enamel Drying	Battery Continuous	30′ x 8′ x 6′	Atmospheric Drilled Pipe	220	1.73
6.	Rosin Melting	10,000-lb. Kettle	16′ x 38″ x 5′2″	10—9″ Tile burners	475	1.84
7.	Varnish Cooking	Typical	210 gallon chg.	Low Pressure Impact	525 ...	1.36 1.80
8.	Tinning	Pot fces	2—1800 lb. 2—3000 lb.	Multitube ring burners—atmos.	650	3.99
9.	Lining RR Journals	1—Solder 1—Babbitt	35″ x 25″ x 7″ 30″ dia. x 12″	Multitube ring burners—atmos.	750	1.99
10.	Zinc Melting	Pot fce	3,000 lb.	Low Pressure Insp. plus Stick tites	760	1.66
11.	Die Casting. Zinc	Automatic	27″ x 13″ x 13″	Low Pressure Insp. plus Stick tites	900	2.44
12.	Aluminum Melting	Tilting Crucible	300 lb.	High Pressure Insp. Tunnel Burners	1400	1.18
13.	Reheating Brake Shoes	Continuous Pusher	15′ x 26″ x 9″	Low Pressure Insp. Tunnel Burners	1550	1.80
14.	Annealing Steel Cast	Car bottom	10′7″ x 10′1″ x 5′2″	High Pressure Insp. Tunnel Burners	1650	1.40
15.	Forging	Slot	26″ x 21½″ x 2½″	Low Pressure Insp. Tunnel Burners	1950	1.47
16.	Forging	Slot	32″ x 11″ x 7″	Low Pressure Insp. Tunnel Burners	1900	2.36
17.	Forging	Slot	19″ x 16″ x 2½″	Low Pressure Insp. Tunnel Burners	1900	1.16
18.	Melting Tin Bronze	Tilting Crucible	#125 crux	Low Pressure Insp. Tunnel Burners	1900	1.11
19.	Melting Red Brass	Crucible	#45 crux	Low Pressure Insp. Tunnel Burners	2300	1.09
20.	Frit Smelting	Stationary	6′3″ x 6′4″ x 18″	Low Pressure Insp. Tunnel Burners	2600	1.10

Note:—Detailed data given on the above in these issues of THE AMERICAN GAS JOURNAL:—

#1—September, 1938. 2—September, 1938. 8—January, 1939. 9—January, 1939. 10—January, 1939. 12—February, 1939. 18—February, 1939.

Note:—Operation #7. Varnish cooking. Two different types of oil burners were in use with quite a wide difference in efficiency.

Note:—Oil figured at 140,000 Btu/gallon in all cases. Gas was a 900 Btu mixed gas in all but #3, 9, 14, and 16 which were on straight natural gas app. 1140 Btu content.

parts on hand, burner cement, diaphragms, mandrels, nozzles, etc. and men that are familiar with this equipment. You will be billed at cost for such work but pay nothing for our periodic inspection or engineering advice." Then you have given that plant a powerful argument for gas fuel. Comparable service, if the consumer buys oil, exists but rarely, if at all. Generally the failure of an oil-fired furnace means it is up to the plant operator to locate and remedy the trouble. The largest plants can perhaps afford a maintenance crew of specialists and a stock room fitted out with ample parts and supplies to meet all emergencies. Few plants of average size, however, are in that position. For them a shutdown is often a calamity, and its cost in lost production many times the monthly fuel bill. Assurance of such service as the gas company gives is a veritable life saver and more than justifies going to gas.

The merits of free service have been argued pro and con many times. Regardless of economic justification or fairness of competition, it is unquestionably true that if it is available in our particular company we will find it one of the most potent weapons we have against fuels that do not possess it. If we do not have unlimited free service but still can do work on the consumer's premises at a reasonable charge, we will still have an advantage, as it is not a

matter of cost but of availability of service that the consumer wants. If neither type of service exists in our company, then it is up to us to capitalize on our knowledge of burner equipment and let the plant operator know that he can count on our being available to supervise work of this nature.

Entirely apart from such service as described above, the industrial gas engineer can be of real help to the plant manager on combustion and furnace problems and do much to forward the interests of gas fuel. Manufacturing today is a complex problem; and if you can take one burden from the shoulders of the operating head, then you have made a friend indeed and justified your calling in life.

Examples of Superiority of Gas Over Oil

So far in these two articles we have compared gas and oil along general lines, pointing out the characteristics of each resulting largely from their physical natures and influencing their value as competitors. Many points of advantage to gas have been enumerated. Naturally in any particular case we make use of but a limited number of these. Perhaps only one is required to swing the scales our way. A few examples will suffice.

A certain large foundry was contemplating a new battery of core ovens, to be located near an existing oil-fired battery. The existing ovens were satisfactory in all respects and costs were reasonable. To use gas would require several hundred feet of house line and a total investment exceeding $1,500 exclusive of burner equipment. Management was quite well sold on oil for the new battery. We were able to point out, however, where a saving in investment of far more than $1,500 was possible in oven construction due to the different method of firing oil and gas. To use oil it would be necessary to excavate beneath the existing floor level and build a suitable substructure and combustion chamber. The ovens were large; the floor was reinforced cement, and the expense so involved would be very heavy. To use gas no excavation whatever would be necessary. Lava tip pipe burners would be laid on the existing floor within the oven proper. High pressure gas was available and air under pressure would not be required. The burner cost would be quite nominal. We obtained the order for gas. Later, after gas had been installed in this new battery we ran comparative tests on the two batteries; and a Btu replacement of 1 of gas to 1.97 of oil led to the conversion of the original battery to similar gas-firing.

Another local plant decided to install a forge shop. Both gas and oil were carefully considered and forges on each fuel installed for trial. Two things led to the decision to use gas exclusively. In the first place the plant was located on rock, with the latter coming within less than a foot of the surface. Any excavation called for blasting, and the expenditure to sink oil storage tanks loomed as a considerable item. The second and deciding point was the fact that with oil-firing the forge lining had to be rebuilt every three weeks, while with gas it lasted six months. The cost of labor and material, not to mention the lost time for such frequent overhauling of a number of furnaces, swung the tide to gas.

A third plant manufactures machine knives. Their annealing, high speed, and welding furnaces were oil-fired. The system had been installed a number of years ago, and the underground storage tank had begun to leak. The three furnaces themselves were badly in need of rebuilding, and the fine degree of temperature control that was desired was sadly lacking. Over a two year period we replaced all three furnaces with modern, well-insulated, gas-designed furnaces with a resulting economy adequate to pay the cost of the change-over. The desire for accurate temperature and atmosphere control was the deciding factor for the use of gas.

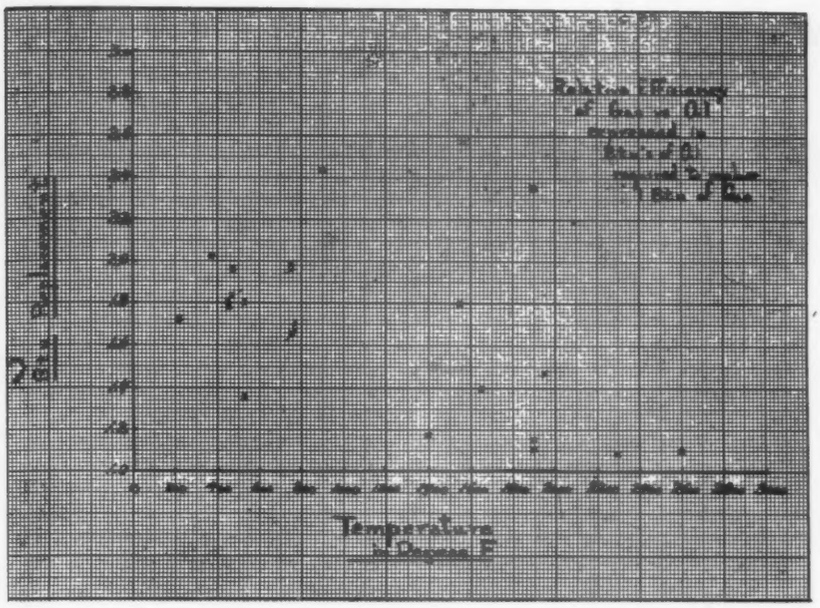
In a fourth large plant, during the worst of the depression, three of the four furnaces in the spring department were converted from gas to Bunker B fuel oil. The department was only operating a few days each month and the shutdowns due to burner failure were of little consequence. The greatest problem was to get the furnaces lighted and under way each morning. Over an hour was required, and during that time dense clouds of black smoke obscured the entire shop. One morning one of the furnace men took a header over another man that had stooped down, visibility being nil. Temperature control was far from perfect, and management would never have tolerated such conditions if production had been a factor. The impetus to change back to gas came, however, from the workmen. Labor made certain demands on the management for better conditions, and one of the requests was that these furnaces be returned to gas-firing. The plant manager quickly assented to this demand at least and the load returned permanently to gas. Thus, working conditions often profoundly influence the choice of a fuel; and the cleanliness and labor-free nature of gas gives it a tremendous advantage over the solid or liquid fuels.

As a last example, in a large chemical works where all types of fuels are used, a certain process proposed called for a fuel that would give accurate temperature control over a long operating cycle. Means had to be provided whereby the heat could be turned off instantly and some way of cooling the kettle furnished if the reaction within the kettle took place too rapidly. Space was also rather limited. Their plant engineers were not able to devise means of oil-firing to meet all these conditions. Gas burners are available in such a variety of types, however, that the problem was easily solved with gas and we obtained the load. A number of small impact burners located in the supporting wall of the kettle just below it fired onto small beds of refractory material directly under the kettle. For cooling the latter, the gas was turned off and the air of the low pressure inspirator sets left on. Another proof of the flexibility of gas and its ability to meet any demands for unusual conditions.

Relative Efficiencies of Gas and Oil

We have left for the last a discussion of the relative efficiencies of gas and fuel oil in actual practice. It should be quite evident from theoretical considerations that gas should be superior. This is the case practice also. In the usual markets fuel oil sells at a lower cost per million heat units than gas. The answer to fuel economy, however, depends not on how many heat units a dollar will buy, but rather how many of the heat units bought for a dollar will do useful work. It is generally easy to convince a prospect that gas is a better all around fuel. Often we hear, "Yes, gas is the better and I'd like to use it, but it costs more and I can't afford the difference." In this case the prospect is comparing the invoice cost of the fuel rather than the ultimate cost, which after all is the only thing that interests him. It doesn't matter if a therm costs seven cents or seventy cents if the final cost per article manufactured is lower using our fuel. We are selling the more expensive "first cost" fuel, but by the law of compensations, usually the least expensive "last cost" fuel.

The writer has had the opportunity of comparing gas and oil costs on all types of operations from core bak-



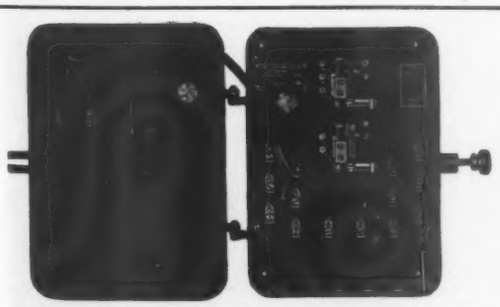
ing to frit smelting, from varnish cooking to brass melting, and has yet to meet a heating operation in which the gas efficiency was not greater than the oil efficiency. Generally the margin was adequate, with the other advantages of gas, to make the ultimate cost less with gas.

The Btu replacement in these cases ran all the way from 1.09 up to 3.99, with the average for 21 cases being 1.76, meaning that the efficiency with gas was 176% of the efficiency with oil. In other words, 1 Btu of gas accomplished as much work as 1.76 Btu's of oil. Expressed still another way, 79.5 cubic feet of 1,000 Btu natural gas or 145 cubic feet of 550 manufactured gas is all that was needed to do the work that required one gallon of 140,000 Btu fuel oil.

The table on page 39 gives in detail the operation involved, the temperature, and certain other pertinent data covering these 21 comparative cases. Even a casual examination of the table shows that in general the lower the temperature involved, the greater the advantage enjoyed by gas. This is still further brought out by the graph that is given. It will be noted that the three core baking ovens, the rosin melting furnace, the mould drying oven, and one of the varnish pits, all operations carried on at approximately 450°-525°F., are extremely closely grouped, averaging about 1.86 Btu replacement. At the other end of the scale, the brass melting furnace, the tin-bronze furnace, and the frit smelter, all at temperatures approaching the upper limit of gas utilization, are grouped around 1.10 Btu replacement. Only two points are really out of line, the die casting furnace and one of the forges. In both cases the oil-firing efficiency was below normal and the change to gas gave a greater than normal increase in efficiency.

On the face of it there would appear little reason why such apparently unrelated data as the Btu replacement in some 21 plants should follow any definite law. Yet the graph shows a fairly definite trend, and the number of points involved almost precludes coincidence. So we offer the following as a possible explanation: At the lower temperatures gas, by means of a multiflame burner, can be burned within the chamber to be heated and still achieve uniform heating. At low temperatures oil, on the other hand, with its intensely hot, highly radiant flame concentrated at a single spot, must be burned outside of the chamber in which the heat is required, in a special combustion chamber. Its hot products of combustion must be diluted with air before being brought into the oven proper. This introduces certain losses, such as the heating up of the special combustion chamber, the radiation losses from this chamber, and the probable introduction of excess air with an accompanying higher stack loss. At high temperatures, however, the two fuels are burned under similar conditions, and the difference in efficiency is probably the measure with which the proper air-fuel ratio is set and maintained. With gas such adjustment is easy to make and easy to maintain. An exactly neutral flame, the most efficient, offers no difficulties. As already explained oil is not subject to such exact regulation and this may well account for the difference. Be that as it may, the superiority of gas holds over the entire range.

This concludes the discussion of the competitive angle involving gas and fuel oil. In summary, oil is a most powerful competitor with an apparent low cost. First cost is not ultimate cost, and invoice cost is not the only thing to consider with oil. Handling cost must be added and then allowance made for the lower operating efficiency of oil. By this time gas is well in the running, and if you know your facts on *both* fuels, you can hope to be successful in selling the better.



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The SERVEL ELECTROLUX *Gas Refrigerator*

THE REFRIGERATOR YOUR CUSTOMERS HEAR ABOUT—BUT NEVER HEAR

Appliance Servicing From A Woman's Viewpoint

By
Miss Jeanette Campbell
The East Ohio Gas Company
Cleveland, Ohio

DURING the past two years The East Ohio Gas Company has been carrying on a survey with the aid of home service advisors in order to find out if Mrs. Housewife's present gas appliances are in good adjustment, if she is pleased with the new time-saving automatic features on modern gas equipment, and if she is satisfied with the service she receives from our company. We explain to each customer that the Gas Company has a partnership interest with her in gas, and that the purpose of our call is to find out if she is using our service to her advantage.

First of all, just what is it in the way of service that the average customer expects from all of us in the gas industry? We have found the following: Free service, twenty-four-hour-a-day service seven days a week, prompt service and at specified times, leaks repaired, meters read whenever the party chooses to be home, even pressure, dependability of service through storms and floods, reliable information, intelligent advice, and courtesy.

1. ***Free Service***—The customer expects that we will not charge for any adjustment. She expects that our service man will be able, if he adjusts her appliances, to lower the operating cost.

2. ***Twenty-four-Hour-a-Day Service Seven Days a Week***—Very few people call our Service Department between the hours of twelve midnight and eight A.M. or on Sundays except in the case of an emergency such as no heat, a leak from the furnace, or a strong odor of gas, but each person likes to have the feeling that should she ever need this particular service, it is available.

3. ***Prompt Service and at Specified Times***—It is sometimes rather difficult to explain to a customer that our Service Department representative cannot come out at just the exact time she chooses, to adjust a range or water heater, but that we will call at her home as quickly as possible, which, in a rush season, may be several days. We do give immediate service on "leaks" and "odor of gas" calls and prompt service on house heating complaints.

4. ***Leaks Repaired*** — Sometimes this involves the expenditure of some money on the part of the customer who is told to employ a plumber. We follow up with a house line test but many people feel that the repair of leaks should be free service and cannot understand that our obligation really stops at the meter.

Miss Jeanette Campbell

5. ***Meter Read Whenever the Party Chooses to Stay Home***—In our company the meter man, not finding anyone at home, leaves a card on which is written:

"Our meter reader has been unable to obtain the regular monthly reading. Kindly mark on this post card the position of the hands on the dial of your meter, fill in name, address, and date, mail to us promptly and you will receive your regular billing."

Four meter dials are printed, and all the customer has to do is to mark those dials at the position where the hand is pointing on the meter. Some customers like this method and others do not; it has its advantages and its disadvantages. Under advantages might be listed:

(a) the bill is received as usual providing the reading is correct.

(b) it reduces the number of repeat calls to get the reading.

The disadvantages are that:

(a) cards sometimes blow away on a windy day unless they are tied to the door or otherwise secured.

(b) the customer sometimes marks the card incorrectly and therefore he does not receive a bill that month; the reason must be explained to him.

(c) some people feel that the company is imposing on them when it requests the card be filled out and mailed.

6. ***Even Pressure***—Customers appreciate that gas pressure today is comparatively even. They expect the Gas Company to keep the pressure uniform, regardless of temperature or temperature changes.

7. ***Dependability of Service Through Storms and Floods***—This is a point which we impress upon the customer—that gas service is dependable because this is something which they have taken for granted for so many years that they tend to forget it, and it is a service which they expect.

8. ***Reliable Information and Intelligent Advice***—Every gas company employee is called upon at one time or another to advise a friend or person seeking information about gas appliances, servicing, etc. The customer expects when she asks questions, to be given a satisfactory answer; she expects to be able to trust and put faith in the advice she receives. Her question may deal with anything from "Will my baby burn himself if he touches the outside of a modern gas oven" to "How much a month does it costs to heat water." These are not questions to be ignored or glibly answered. Each customer's problem should be our problem. Each service man, home service girl, credit clerk, bill complaint clerk and appliance salesman should be given similar instructions in a school carried on by each individual company so that the same sort of answers will be given to customer questions by each department. I am going to take up the service school a little later in this paper. If Mr. and Mrs. Housekeeper find that our service

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men give intelligent and helpful information, not only about servicing but about the many advantages of modern gas appliances, isn't it only reasonable to suppose that there will be built up between the customer and the company, because of the customer interest shown by the service man, a greater feeling of respect and good will?

9. *Courtesy*—I have saved this until last although it is more often mentioned by the customer than any other one thing. Our customers demand courtesy and respect from all of our employees. They expect a smile and a greeting from our meter readers and service men. As we are primarily interested in the service problem, I will not mention what may be expected from other departments in the organization.

Sometimes a service call may appear entirely unnecessary as all appliances are in good condition and adjustment but the human element enters in here. There are some people who impose on the company's free service policy and demand attention on the slightest provocation but the majority of our customers when they ask us to make adjustments are sincere in believing their appliance or appliances are not delivering all they are capable of, otherwise they would not go to the trouble of calling us. Does our service man give proper heed to this fact when he answers Mrs. Jones' call? Does he go into her kitchen, look at her range, turn on the burners, take one look at the fire they make and say "there is nothing wrong with those burners, that is a good fire," or does he remove a burner and examine it, run his brush through the ports and the mixer to make sure it is clean and free from rust and scale and then readjust it as carefully as he knows how? He does if he's smart; he knows that it is not always what he does but the way in which he does it which impresses Mrs. Jones with the feeling that he knows his business.

Now that we know what women expect in the way of service we might mention certain things which they like or would like: a periodic inspection to see that there are no leaks in their house lines, adjustment of oven regulators, reasonable cleanliness and neatness of personal appearance for meter and service men, and outside meters. Since some utilities are placing meters on the outside of the house there are a number of requests for gas meters to be there too. Then the meter could be read every month without fail and it would save women coming to the door, letting the man in, and having him track slush and water into the house in stormy weather, a thing which no woman likes.

Did you ever stop to think that a request that the meter be placed outdoors is a very natural one for a woman to make? To her a meter is a meter, whether it measures kilowatts or cubic feet and to her it seems perfectly logical that both could be outdoors. Where the Gas Company prefers to install the meter indoors the service man or meter reader should take the trouble to explain to her why his company feels it's in the best interests of everyone concerned to have the meter inside where it is not subject to rapid temperature changes and where it will not freeze and cause interruption of service—the very thing he has assured her never happens. There may be other reasons why it is necessary for the meter man to go into the house, but these reasons should be explained to her. She will understand and appreciate the explanation instead of thinking that we are arbitrary and old-fashioned.

In speaking of modern, automatic, gas appliances, I am going to limit myself to ranges, the refrigerator, water heaters, and furnaces—tell you what the women with whom we have talked think of them, what they expect of them and what features they would like to add or change.

Not only those of us in the utility business, but the buying public as well is being made range-conscious today. Let us see what the average housewife would build into a range if she were designing it herself, and how she would expect it to perform. Most of the following items are already included in our modern gas range:

Cleanliness and beauty are the first and foremost requirements. The burners on a range must be of the non-clog type which are easy to keep clean. They should be so adjusted that pans do not become blackened and gas is not wasted. Women realize that proper adjustment of the appliance is essential to cleanliness and reasonable operating cost.

Ranges ought to be so built that they can be placed flush with the wall to conform with the trend toward smaller and more compact kitchens. There is already a large number of this type being built today.

Next is cooking speed. The arrangement of one large burner and three small burners seems to be the answer to quick cooking. Some women favor having two large burners. Most women want the gas flames turned higher than is necessary and many times I find that they firmly believe if the flame comes up around the pans the cooking process will be speeded up. Perhaps this is in part, at least, due to the flame on the modern top burner issuing from horizontal ports instead of the vertical ones to which she has been so long accustomed. Quick preheating of the modern ovens and broilers is favored by most women with whom we have talked.

Economy of operation—Insulation in the range, construction of top, oven and broiler burners must be such as to yield the greatest possible efficiency.

Automatic operation—top burners and ovens must light quickly and automatically so that the minimum effort is required from the housewife. It was surprising to me to find how few women in our territory expect or even want automatic oven clocks. They feel that the low temperature oven accomplishes practically the same result. The oven clock, I know, is very popular in some sections of the country and the demand for them, I believe, will increase.

Women realize that the more automatic features a stove possesses, the oftener it may need servicing, *but they* are willing to put up with this possibility if it means less work for them the majority of the time.

Many women have told our home service girls that although they like an automatic lighting oven, they feel that a separate broiler with automatic lighting would be a waste of money as far as they are concerned. They feel that they do not use the broiler sufficiently often to justify a pilot light burning in it all of the time. Women expect speedy, smokeless broilers which are easily removed from the compartment for cleaning. They want, on the whole, separate broilers which pull out like a drawer on roller bearings, swing out, or raise up. In some cases radiant broilers are preferred.

Simmer burners—It is the consensus of opinion of numerous women in our territory that four simmer burners with two simmer sets should be included on every range. The second simmer set should be so low that it just keeps foods or beverages such as coffee warm without boiling.

Deep well cookers—The popularity of these seems to be growing and a goodly number of women today

would include this in a range. They use the deep well not only for whole meals but for deep fat frying, soups, sterilization of jelly glasses and baby bottles, and for the steaming of puddings.

Ovens—Besides automatic lighting and quick preheating, women expect that ovens will be heavily insulated to keep kitchens cool in summer and to keep children from burning themselves. Also, they expect uniform baking results at all times, and oven heat regulators which stay accurate over a period of years.

Oven bottoms and racks should be rust-proof and easy to remove for cleaning.

Exterior of ranges should be easy to clean, stain-proof and chip-proof.

Accessories—Lights in ovens and on top of the range, minute minders, clocks, salt and pepper shakers are all conveniences which women feel are desirable but not necessary.

All of these features which women want, they expect to be able to get at a low initial cost, and nominal upkeep.

Criticisms of the new ranges given us by our customers are these:

1. Low, streamlined ranges—complaints about these come principally from older women who believe that there should be "no stoop, no squat, and no squint."

2. If any of you men could invent grids for top burners which would not lose their glossy finish after years of use the women of America or at least Cleveland and vicinity would bestow on you a rousing vote of thanks. Also, on some ranges the grids are so designed as to permit small pans to slide off.

3. Low broilers are another of Mrs. Modern's pet grievances along with broilers being too small but so long as we continue to manufacture the larger portion of ranges with the broilers under the oven we are doing our part to keep the silk stocking industry on the upswing.

4. Top burners sometimes do not ignite instantly. This is often a matter of air adjustment.

The Certified Performance range has not been long enough in service in our area to warrant any fixed opinion as to its acceptance and its servicing requirements. It should be stated, however, that many of the things which I have told you Mrs. Housewife wants in her new range have been incorporated in the C/P ranges. Like any other new appliance, our service men will have to be trained in the proper adjustment and operation of it.

These points I have mentioned are merely the highlights which come most readily to mind as a result of my daily contacts with the housewives.

Not long ago in a home in Cleveland I found a very talented water heater. It sang. Really it hummed a regular tune, and the lady who owned it would not part with it for any other type heater nor would she have it adjusted. It seems that that heater provides great amusement for all of her visitors. Not all heaters, however, provide such amusement, particularly when you want hot water and cannot get it.

When you ask the average woman what kind of a water heater she has she does not know whether it is a side arm, automatic, or instantaneous heater and what's more many think

that the old side arm heater, or "tank" as they are commonly called, is the only kind of water heater there is. They don't know of the comforts of modern automatic, thermostatically controlled water heating but they do know what you are talking about when you ask if their heater provides enough clean, hot water twenty-four hours each day. Most of the old side arm heaters do not provide such a service, and if they do, the cost of heating all of that water is exorbitant.

In asking the question "What do you expect of your water heater or of a modern gas water heater?" we found that women want clean, hot water twenty-four hours a day, seven days a week at practically no cost. They want to be able to wash, take baths, and use hot water for household duties such as cleaning of woodwork, dishes, etc., without the water supply running cold. When told that an insulated, automatic gas water heater will give them all that they ask for in this respect, they conceive the brilliant idea that a thin sheet of asbestos and a gadget resembling a thermostat can be connected on the old side arm water heater by their handy husband in some of his spare moments and then, of course, a service man can adjust the flame and they're all set. That is what *they* think, but wait until washday or those Saturday night baths and all of their dreams are shattered. We owe it to ourselves to train our service men not only to adjust water heaters but also to correct this erroneous idea which is prevalent among many people. We should encourage them to sell the idea of gas automatic storage water heaters for every home. There is no better time to sell modern water heaters than when adjusting the customer's old one because each person is vitally interested in his belongings and especially in those things which add to his personal comfort. Hot water should not be a luxury in this country. If we were living in China we would buy our hot water at a shop. If we returned that water after using it, we would have some of our money refunded, and the next fellow who used it would pay less than we did and so on until eight or ten people had used the same water for bathing purposes. We in America do not, thank heaven, have to do that. Even a poor man over here can afford hot water service.

Just what do women think of our gas refrigerator? As is true of almost everything there are features which are liked and others which are disliked. The following points are liked by women who use them:

(1) Low operating cost.
(2) Maintenance.
(3) Quietness.
(4) The newtone enamel finish and the interior layout of the refrigerator.

The house heating load in territory where costs are not too prohibitive is growing every year. We now have women saying, "Henry and I are thinking seriously of installing a gas furnace next year. He is so sick of shovelling coal and I'm tired of cleaning soot off the woodwork and furniture." Modern men and women want in their homes, pleasant warmth, the minimum of dirt, and even temperature maintained in every room, without any effort on their part and without a large initial and operating cost. Gas heat can do all of these things.

Our company cooperates with dealers in heating equipment. We

finance heating installations made by the dealer provided they conform to certain requirements designed to insure the user comfortable temperatures and reasonable operating costs. We furnish the dealer and prospective heating customer, free of charge, the services of our house heating engineers who check all heating surveys and compute all estimates of heating costs. They make recommendations intended to improve the heating or lower the consumption. They check each conversion burner installation to see that it is properly and neatly installed, they make analyses of the flue gases and take flue temperatures to see that the highest efficiency commensurate with good operating characteristics is being obtained. They handle all house heating high bill claims and help the regular service man when, in the course of his regular work, he runs into complaints on heating that he cannot handle. The service men are on call anytime day or night and they are capable of correcting many heating difficulties unassisted.

Perhaps you have many times heard people say that gas is damp and they wouldn't care to heat with it. They have the feeling that it isn't healthy. We tell these people that we would be happy if gas were damp because if we want to be healthy we should have a certain amount of moisture in the air but they get this idea from condensed water vapor on the windows. Did you ever say to them "You have a heater in your automobile, do you not?" "Why, yes!" is the answer. "When you turn that heater on a mist forms on the windows of your car and you cannot see out." "Oh, yes!" is the answer. "That heater is not operated with a gas flame, is it?" "No!" is the reply. "Then what causes the moisture on the windows?" you ask. Most women (and many men) cannot give an intelligent answer to this question. You then proceed to explain that the moisture is present in the air in the car and when it strikes the cold glass it condenses. Next, you ask, "What takes place when you turn on the defrosting fan?" "Moisture disappears, does it not?" "That is because you have circulated warm air from the interior of the car against the glass causing the moisture to evaporate; the warmer air becomes the more moisture it can hold." Usually this comparison with a phenomenon they have seen occur many times is sufficient to shake severely their conviction that gas heat is damp heat.

I have tried to express the preferences and prejudices of several thousands of women in our territory but how are we going to apply these principles in improving our service? A school for the service men is one answer to this question. Service men, in many instances, the connecting link between our customers and our company. What the customer thinks of them she will also think of us. If we want our customers to think that their gas company is the fairest and best organization with which they deal we will see that all contact employees are courteous, that they are neat not only in appearance but in the work they do and the way in which they go about it. Isn't it a boost for our organization if Mrs. Jones tells her neighbors, friends, and club groups that "The Gas Company certainly is considerate." "They sent the nicest man out yesterday to adjust my range. He smiled at me, wiped his feet outside the door, and after he had finished adjusting my range he took a damp cloth and wiped off the top where his tools had left a few dirty marks. Not only that but he told me so much about the ease of cooking on modern gas ranges that I'm going to look at the new ones on the Gas Company display floor this next week. He said that a home service girl would tell me even more about them; all about some sort of waterless cooking and low temperature roasting. Why, he even asked if I had all the hot water I needed and adjusted the flame on the water heater, too. He told me that an automatic gas water heater would cut those bills my husband has been complaining about and when I asked him why the Gas Company was interested in decreasing the bills you know what he said? That the Gas Company is more interested in having a satisfied customer than one who uses a great deal of gas and is dissatisfied. I asked him why my cakes didn't rise the way they should and he told me he would have a home service girl call at my house." Sometimes without adequate instruction the service man undertakes to answer questions which could be more completely and satisfactorily answered by a Home Service Department representative.

In his endeavor to please, he sometimes gets into "deep water." From a training course he will understand that one of the Home Service Department's functions is to supplement his knowledge of cooking and baking operations and to help him out when he feels his own store of knowledge is inadequate. The converse of this is also true; the home service girl sometimes gets in pretty deep too in trying to answer some question put to her and she can benefit much from listening to some of the service man's experiences. Better cooperation between the Home Service Department and the Service Department will, I believe, prove helpful to both in their contacts with our customers.

Our contact employees are fast becoming key men in our business and in our contacts with the public. If they are to keep abreast of our present day demands upon them they must be given adequate training not only in the mechanics of appliance adjustment and service, but also in those little niceties which we women appreciate. The service man who answers service requests with friendliness, tact, sympathetic understanding can oftentimes accomplish far more effective and permanent results than he can with his screwdriver and wrench.

Gas for "All Four" Services in this Model Home

Above is the "All-American" home designed to embody the traditions of yesterday while aiming at "tomorrow's" living based on the average American preferences, which is part of the gas industry's exhibit at the New York World's Fair.

EVEN THE ECONOMY GROUP BATHES—

It may surprise you but the Jones family over on 8th Avenue bathes about as regularly as their more prosperous neighbors on the Drive.

However they don't use gas to heat their water and here's the reason:

Every utility has two groups of customers—

The Service Group—

A relatively small percentage of your customers to whom the class of service is more important than its cost. This group grades automatic water heating features in the following order of importance:

1. **Unlimited Service**
2. **Cost of Operation**
3. **Cost of Equipment**

The needs of the service group are very well supplied by the many excellent fast recovery heaters now on the market.

The Economy Group—

This group embraces a far larger body of customers. The economy group wants to enjoy most of the modern comforts but must watch expenditures more closely. Unless you have something different to offer the economy group will stick to its furnace coil and jackstove. The economy group grades automatic water heating features much differently than does the service group. In order of importance these features are ranked as follows:

1. **Cost of Operation**
2. **Adequate Service—not necessarily unlimited**
3. **Cost of Equipment**

Note how the Republic LO-BILL *conversion water heater satisfies the Economy Group—*

1. **Cost of Operation**
   Averaging thirteen therms per month

2. **Adequate Service**
   Taking care of the entire needs of families of five or less. Draws of sixty gallons per day handled with ease.

3. **Cost of Equipment**
   So low that there is no justification in offering anything less than this fully automatic equipment.

AUTOGAS CORPORATION

2258 Diversey Pkwy. Chicago, Ill.

General Sales Agent REPUBLIC HEATERS SALES CO. CHICAGO, Ill.

Rural Gasification Activities

By

J. Woodward Martin

Lone Star Gas Company
Dallas, Texas

WHY should "Rural Gasification Activities" be of interest to men and women already engaged in a natural or manufactured gas business? Possibly the answer lies in the following conditions.

First, a vast rural market exists for a gas service. This market is becoming more and more conscious of gas as a fuel and is rapidly applying gas to its household and industrial needs. The following figures bear testimony to this fact:

	Gallons of Liquefied Gas Were Used
In 1922 a total of	222,641
In 1927 a total of	1,091,005
In 1932 a total of	34,114,787
In 1937 a total of	141,505,000
In 1938 a total of	157,000,000

In 1927 there were less than 50,000 users. In 1937 there were approximately 400,000 active domestic customers using some liquefied gas service. In 1938 this number increased to well over 500,000.

In good times this growth (1927-1938) would be a record of some sort. When consideration is taken of the country wide economic conditions that did prevail during the greater part of this period, this growth of a new industry definitely points a way to new and larger gas loads and new and larger gas revenues.

Second, an abundant supply of low cost fuel; namely, propane and butane, is available for rural gasification activities, and is as close at hand as natural gas and refined petroleum products. The sources of supply of these fuels are the petroleum refineries and natural gas gasoline plants. Texas, California, Oklahoma, Louisiana, Kansas, Arkansas, Kentucky, West Virginia, Pennsylvania, and others to a lesser degree, are the states in which an abundance of these fuels are available, and in which the refineries and natural gasoline plants for supplying the finished product are already in operation.

Third, the various utilization equipment, ranges, water heaters, refrigerators and all types of house heating equipment, constructed specifically for the gases used in rural service, are already in production by the same reliable concerns that supply the utilization equipment for natural gas service.

Fourth, the various equipment needed to provide service and the manner and methods of rendering service have been developed to such a point that the service rendered to rural customers by some companies in the business equals the best provided by conventional gas distribution systems and excels any others not up to the highest standard.

Fifth, the existing gas companies are established and doing business in the very middle of this market. The source of supply of the fuel is close at hand. All of us are engaged in merchandising gas appliances and already have sales organization, display floors, appliance stocks and sales experience. Service equipment has been developed and service methods devised and proven whereby gas service can be rendered to this rural market. Such equipment and methods are at our command to use. With additions to capital account and with but slight additions to present personnel, these existing gas companies are in position to easily expand their services into their surrounding rural districts.

I am aware that there are many different conditions to be met in rendering rural gas service in the various parts of the country. Weather conditions, the occupations and living habits of the people, and the cost of competitive fuels are different in one part of the country from those in another part—all have their effect on the very nature of the rural gasification activity in the particular territory. In the North and East, rural gasification activities are confined principally to cooking, summer water heating when the furnaces are out of use and refrigeration. The costs of manufactured gas and electricity constitute the standards by which other fuels for these same services are compared. The severity of the winter weather in the North and East, coupled with the comparative cost of gas services and competitive fuels, prevents gas from being the predominating heating fuel in straight manufactured gas territories.

In the Southern and Southwestern states, our winters are comparatively mild and room heaters, regardless of the fuel used, predominate. Natural gas, where available, sets the standard for fuel costs for all household heating services, including house heating. For a rural gas service to be complete and meet the expectations and requirements of the rural user adjacent to the natural gas user, such service must also be at such cost that it can be applied to the full heating needs of a rural home, including the house heating needs.

The particular fuels used in rendering gas service to the rural markets in the Southern States are commercial propane, commercial butane and, in some cases, mixtures of the two. They are stored, transported, and delivered in liquid form but utilized as a dry gas. We are all, more or less, familiar with the so-called "bottled gas" type of service. In this service, propane is the fuel that is used most generally. This type of service has been on the market since about 1916. However, due to its cost, necessarily high because of the high cost of distribution, only a modest acceptance on the part of the rural market was experienced by it. About four years ago, certain interests and individuals, in Texas particularly, became interested in the use of butane as a fuel for this rural market, and development work started on the proper methods and equipment needed to serve butane as a gas to this rural market.

The reasons for the change from propane to butane may be gathered from a brief study of the physical characteristics of the two fuels. At a temperature of 100° F., commercial propane has a vapor pressure of about 200 pounds per sq. in.; while commercial butane has a vapor pressure of about 65 pounds per sq. in. This means that all containers, the large storage tanks at the refineries or gasoline plants, the tank cars, the district storage tanks, the truck tanks and the individual customer tanks

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must be built approximately 3 times as heavy for propane as is necessary for butane. This difference in the pressures of the two fuels not only makes for a lower initial cost for equipment to store, transport, and deliver butane, but where such involves transportation equipment, quite naturally, there is less "dead weight" to be moved per gallon of butane as compared to propane because butane containers are much lighter.

A gallon of butane contains about 11% more heat units than a gallon of propane, yet the freight cost is the same for a gallon of propane as for a gallon of butane when shipped in tank car quantities. If the fuels are shipped in small containers, the difference in the weight of the container for butane and that for propane would be another factor in favor of butane. These characteristics make it possible, therefore, for a given amount of heat to be handled, transported, stored and delivered cheaper in the form of butane than propane.

Butane has one physical characteristic that, up to recent years, has prevented its use in rural gasification activities except in a few territories where the weather is mild the year 'round. This particular characteristic is its relatively high boiling point which is 33° F., or the temperature at which water freezes. This means, in the case of pure normal butane, that when the temperature gets below 33° F. there will be no pressure on the fuel and no service in the home. In the case of propane, its boiling point is 48° F. *below Zero* and no such trouble in winter weather is normally encountered. Therefore, in order to use butane and thereby take advantage of the savings in handling and distributing previously discussed, heat must be provided to maintain the butane above 33° F., or above its boiling point during cold weather. Also, additional heat must be supplied to vaporize or to change it from liquid to gas, and the more load on the tank, the more liquid must be vaporized, and hence, the more of such heat is required.

In the summer months when the light and intermittent demands for cooking, water heating, and refrigerating constitute the entire load, atmospheric temperatures are ample to supply the necessary heat. In winter months, however, when temperatures are low and the additional heating load imposes many times the demand on the butane system no heat is furnished by the atmosphere and the necessary heat must be obtained from other sources. As in all other matters, there are differences of opinions as to the best method of meeting this condition. These opinions classify themselves into two general groups—those who believe in burying the butane container in the ground below the frost line and relying on the heat of the ground to maintain pressure; and those who believe in keeping the container out of the ground away from soil corrosion, where the entire container can be periodically inspected, and maintained at low cost. In the latter group, the necessary heat to maintain pressure in winter is supplied by a gas flame applied to the container and controlled such as to maintain any desired pressure under all conditions.

In the underground butane systems, there are many designs of containers—almost as many as there are firms engaged in the business; however, the differences in design are minor and all involve the one basic principle of using the heat of the ground to maintain pressure. In the aboveground type, there is but one that I know of that is suitable for use in all climates. This is one that has been developed by and used in the rural gas service rendered by Lone Star Gas System.

There are two general types of businesses engaged in rural gasification activities in the South and Southwest at this time. One is a "Merchandising Type" and the other a "Gas Utility Type."

In the merchandising type of business, the controlling motive is the profit from the sale of the tanks and appliances with but secondary importance placed on the sale of the gas itself, or on the gas service provided to the customer. In many cases the fuel service is actually divorced from the sale of tanks and appliances and is carried on by an entirely different organization. In territories where the market is "lean," justifying only one distributor, or in more fertile territories where several firms are engaged in the sale of tanks and appliances, the same organization must engage in the fuel or butane business in order to sell the tanks and appliances. The particular merchant engaged in the business sells all equipment installed on the customer's premises to the customer, in the same manner that carbide plants. individual electric plants, etc., have been sold to this market for years. Such type of business handles the underground, or buried, type of customer unit entirely. The only investment this type of business requires is in a tank truck or two and in some cases, in a bulk storage tank. The customer bears all other investments. There are a few instances, however, where some individuals engaged in this business are leasing or renting the customer's unit of the underground type, but such are rare in the South and Southwest.

In the gas utility type, the motive, of course, is the profit from the gas service itself—the same as with any other gas utility enterprise. All equipment necessary to provide a continuous supply of fuel to the customer's yard line is furnished and maintained by the Service Organization—the same as is done in conventional pipe line services. The aboveground type of customer unit is used in this type of business for obvious reasons. As this equipment represents an investment on the part of the company, every means must be employed to insure a long life—which means that underground soil corrosion must be avoided; which means that it must be designed and constructed to permit periodic inspections at low cost; it must be safe because it is company property installed on customer's premises. Being aboveground enables the investment to be kept more active at less cost because it can be moved from one house, that may become vacant, over to an active account with very little trouble and expense. Also, it must handle all types of customers with perfect satisfaction under all conditions, and must be low in initial cost.

The appliances must be specifically designed and constructed for use with butane with the same accuracy as for manufactured or natural gas. Natural gas appliances are not suitable for butane service no more than appliances for manufactured gas are suitable for use with natural gas. Much higher operating efficiencies are possible with butane as compared to natural or manufactured gases, in certain applications, especially so with top burner cooking. This fact brings the cost of certain heat applications with butane even closer to that with natural gas than a comparison of their respective rates at first appear when viewed strictly from an equivalent B.t.u. standpoint. The A.G.A. Laboratories at Cleveland are thoroughly familiar with the requirements for butane appliances and will soon be equipped to test and approve appliances of all kinds for butane service. In fact, the January 1939 list of approved appliances shows that the Laboratories have tested and approved 10 different lines of ranges and 9 different lines of water heaters for use with undiluted butane. A

great many more have been approved for use with propane. This is a most important step toward insuring satisfaction to the customers on this infant gas service and towards insuring against service calls on the part of the company.

The general procedure by which butane is distributed may be briefly stated as follows:

The butane distributor equips himself with a truck and sends it to a nearby natural gasoline plant for his butane and then distributes it to the individual customer's tanks as they become low and as the customer notifies the butane distributor of that fact. In the utility type service, the company assumes responsibility for maintaining a supply at all times without any attention on the part of the customer. As the business grows and requires it, the distributor equips himself with local bulk storage of sufficient capacity to receive shipments in tank car quantities. In such a case, the distribution truck loads out of this local storage and distributes to the customers' tanks. The gas is handled, as you may have inferred, in liquid form for the very obvious reason that in a liquid form it occupies less space. After it is loaded into the customer's unit, it flows out under its own pressure as a dry gas and is distributed through the yard line and housepiping to the various openings in the home, school, factory, tourist camp or otherwise, at a gauge pressure of about 6 ounces.

The cost on the part of the customer to install a butane tank under the merchandising type of business mentioned varies from about $125.00, for a tank of sufficient size to adequately take care of a range and possibly a water heater, to about $350.00 for a unit of sufficient size to take care of all fuel requirements, including heating in the home and in a climate where winters reach and remain for several days at about 15° F. or lower. These costs do not include any appliances but merely cover the cost of the tank and the yard line. The cost on the part of the customer to install service of the gas utility type is about the same as the cost for a natural gas customer to install gas in the city. In some cases, it is actually less due to the fact that the yard lines are shorter than are required for natural gas service where the mains lie in the street or alley; and due to the fact that the sizes of the pipe are smaller than those used on natural gas because butane gas has about three times the heating value of natural gas.

The price charged for the butane varies from 6½ cents per gallon, delivered in the customer's tank, in territories where cut-throat competition exists, and which price definitely includes no profit, to 12 cents and in some instances 15 cents per gallon. Ten gallons of butane are equivalent to 1000 cu. ft. of natural gas of 1000 B.t.u. heat value. Therefore, butane selling at 6½ cents per gallon would give the customer as much heat as 65 cents per M.C.F. of natural gas. At 12 cents a gallon, the comparison would be $1.20 per 1000 cu. ft. of natural gas.

In the gas utility type of business rates are constructed from a promotional angle and on a sliding scale, and approach that of natural gas rates remarkably close considering the short time such service has been provided. The average price per gallon paid by an individual customer is therefore dependent on the amount of use he has for the gas and the resultant consumption. The first step in conjunction with a minimum monthly bill is designed such as to insure every customer paying his pro rata cost of service. After this, the rate drops sharply. The rate now in effect on New Stargas Service, the name given to the rural gas service rendered by Lone Star Gas System, is as follows:

Minimum Monthly Bill—$2.75 which entitles customer to 2 gallons per month, and

9c net per gallon for next 48 gallons per month,

8c net per gallon for all over 50 gallons per month.

Two (2) cents per gallon is added if bills are not paid within ten (10) days from date of billing.

Expressed in terms of equivalent M.C.F. natural gas, the rate would be:

Minimum Monthly Bill—$2.75 which entitles customer to 200 cubic feet per month, and

90c net per M.C.F. for next 4.8 M.C.F. per month.

80c net per M.C.F. for all over 5 M.C.F. per month.

Expressed in terms of manufactured gas of 500 B.t.u. heating value, the rate would be:

Minimum Monthly Bill—$2.75 which entitles customer to 400 cubic feet per month, and

45c net per M.C.F. for next 9.6 M.C.F. per month.

40c net per M.C.F. for all over 10 M.C.F. per month.

Expressed in terms of electric energy, we have the following equivalent electric rate:

Minimum Monthly Bill—$2.75 which entitles the customer to 60 Kwh. per month, and

3 mills net per Kwh. for the next 1,440 Kwh. per month.

2 2/3 mills net per Kwh. for all over 1,500 Kwh. per month.

In viewing this rate for New Stargas Service as compared to natural and manufactured gases and to electricity, it must be kept in mind that the service these rural customers receive is in no manner or detail inferior to that received by customers on any natural or manufactured gas system. The company invests in and maintains all equipment necessary to provide continuous service to each customer's yard line—the same as it does in pipe line service. The responsibility for maintaining an ample supply of fuel for each customer's instant use rests solely on the company—the same as in pipe line service. All leakage up to the point where company equipment is attached to customer's yard line is borne by company—the same as in pipe line service. Bills for service are rendered monthly for the amount of fuel that has been used—the same as in pipe line service. Service may be discontinued by customer whenever he wishes—the same as on pipe line service.

The cost to install the service and the cost of the appliances to use the service are the same as for natural gas. The monthly cost is only a little higher than for most natural gas services and definitely cheaper than any other comparable fuel services.

The prevailing price for butane in tank car quantities is three and one-half (3½) cents and lower as the requirements increase, F.O.B. shipper's cars at the gasoline plants. The tank cars are customarily owned by the producers of butane.

I do not intend to bombard you with a lot of statistics and figures, but it may be of interest to some here to know the experience Lone Star Gas System has had with their New Stargas Service. At the present time, service is rendered in six districts on Lone Star Gas System; Dallas, Fort Worth, Waco, Temple, Taylor and Georgetown. This service is provided to customers within an approximate radius of 25 miles of each of these district points. Service was started in the Dallas area in the summer of 1935; in the Fort Worth area, the summer of 1936; in the Waco area, the summer of 1937; and in Temple, Taylor and Georgetown in November 1937. We have found that the investment runs about $175.00 per customer at the present time. As more customers are added around the bulk stations in these districts, the pro rata investment will be reduced some. Gross revenue per customer amounts to about $67.00 per year at this time, and with present

(Continued on page 70)

A Set of Standards for Installing Gas Winter Air Conditioning Is Sponsored By Gas Companies

By
H. P. Morehouse
Chairman, Sub-Committee on Improved Selling Practice A.G.A. House Heating & Air Conditioning Committee.

THE gas companies, who are members of the *Metropolitan Heating and Air Conditioning Council. have prepared a set of rules outlining recommended practices for the installation of gas winter air conditioning in new homes. The rules are in booklet form and the work is known as the Gasco Installation Guide.

H. P. Morehouse

These standards, prepared by a joint committee of the Council and the Metropolitan Service Managers Group, have created such interest throughout the gas industry that the American Gas Association has taken over their distribution on a national basis and is making the book available in quantity to all gas companies, manufacturers and other interested parties, at a nominal cost.

The reason for the preparation of these standards was to bring order out of the chaotic state into which winter air conditioning was falling because of the unorthodox installation practices that were being followed.

As is so often the case with a new art, engineering, care and experience go to make up its early history. Then when a well deserved popularity has been attained the vendors vie with each other to cut costs in an effort to get the order. These reductions in sales price are invariably accompanied by a reduction in quality, workmanship and engineering skill. There is a tendency to chisel and cut corners to a point where unsatisfactory results are the unfortunate experience of the innocent buyer.

Such has been the history of gas winter air conditioning in the East. During its early history each installation was carefully and individually engineered. The results were extremely satisfactory. The new art seemed destined to become the standard by which good heating was judged. Gas companies everywhere encouraged this new method of heating because it offered them their best opportunity for getting the new home market. It was the lowest cost system to install. It operated at a lower fuel cost than steam or hot water systems and it had a definite romantic advertising appeal due to its newness and the wide publicity given to its counterpart, summer air conditioning.

Also gas companies soon came to recognize that heating homes by winter air conditioning, regardless of the heating fuel used, was to their advantage. When other types of heating systems were used with other fuels the domestic hot water was usually furnished by a summer winter hook-up. This meant the loss of the hot water load for gas. But with winter air conditioning there is no satisfactory combination method to furnish domestic hot water. The result is that even when oil or coal is used for winter air conditioning the valuable hot water load is usually retained on gas.

It is therefore evident that the utilities cannot afford to see the good name of winter air conditioning blackened by unsatisfactory installations. Such a situation was rapidly approaching when the Gasco Installation Guide committee was formed.

The Gasco Installation Guide was *not* prepared as a *Code of Minimum Requirements*, but rather as a set of standards through which everyone concerned could be assured of a first-class installation. Its language is that of "suggestions" rather than "demands." Its rules are not ideals toward which we might strive but never reach. There are no fancy theories or unnecessary recommendations. On the contrary the rules follow the standards suggested by such recognized authorities as the American Society of Heating & Ventilating Engineers, The National Warm Air Heating and Air Conditioning Association, National Board of Fire Underwriters, American Gas Association and over one hundred manufacturers of gas fired winter air conditioning equipment.

The question immediately comes up as to how such a set of rules can be made to work. The policy of policing installation practices is of course something each utility will have to decide upon for themselves. However, the G.I.G. committee offer one possible solution to get the Guide into widespread use. This is a single sheet specification form which may be purchased through the A.G.A. in padded form. This form when signed by the installer is a contract to make the installation according to the precepts of the Gasco Guide. There is room on the form for exceptions to be taken to certain rules. These exceptions are taken in writing and are agreed to in advance between the owner, architect or builder, on the one hand and the dealer or installer on the other. Such a set of standards reduced to a simple contractual agreement offers an advantage also to the dealer. He knows when he places his bid that he is bidding against a comparable installation by his competitor. His interest in cutting corners is thus to a considerable degree diminished. It is urged that all utilities who adopt the Gasco Installation Guide as their standard, furnish all dealers and installers with extra blank copies of the specification form and also to urge architects, builders and prospective home builders, to insist that a signed specification form accompany each dealer's bid.

We will review here briefly the main subdivisions of the Gasco Installation Guide in order to give an idea of its contents:

I. Equipment approval
II. Heating Unit
- **A. Fan and Motor**
- **B. Size**

III. Erection of Furnace
IV. Installation of Furnace
- **A. Furnace Room**
- **B. Accessibility**

** Metropolitan Heating and Air Conditioning Council is an organization composed of representatives of the 18 Gas Companies in the Metropolitan New York City Area.*

V. Controls
- A. Thermostat
- B. Furnace Control
- C. Summer Switch
- D. Humidifiers

VI. Air Ducts
- A. General
- B. Supply Ducts
- C. Return Ducts
- D. Dampers
- E. Supports

VII. Registers and Grilles
- A. General
- B. Supply Registers
- C. Return Grilles

VIII. Filters

IX. Electrical Connections

X. Balancing Systems

XI. General

Copy of Specification Form. Drawings showing Structural Details for Good Duct Work Practice.

A compact set of rules like the Gasco Installation Guide are of tremendous importance to all gas utilities. Not only are such a set of standards absolutely necessary to the continued and deserved popularity of winter air conditioning but the acceptance and conformance to them by the installers can only be controlled by intelligent utility guidance.

As has already been mentioned the Guide represents best practice and not minimum standards. There is, however, room for a lower set of standards to take care of low priced speculative houses. Such decisions as to whether to use a clock or manual thermostat, insulate duct work, put canvas connections in trunk lines, noise and many others, are items on which compromises may be made and the user may still have a reasonably comfortable home. But on such decisions as sizing the unit, care in its erection, ample supplies and returns, adequate dampers, etc. are "must" items on which no compromises should be made.

These "must" items can best be covered by a "Code of Minimum Requirements" which should be enforced by the utility under penalty of withholding free service from installations not meeting these minimum requirements.

Such a Code of Minimum Requirements has been drafted by the New Jersey Gas Association and copies are available by addressing the Secretary, or the writer, at 80 Park Place, Newark, New Jersey.

Every utility and winter air conditioning manufacturer should obtain a copy of the Gasco Installation Guide for inspection. When such a set of standards has been universally adopted there need be no fear about the future of gas winter air conditioning.

Gas Appliance Dealer Assists Other Merchants In Putting Out Different Greeters Book

Practically all progressive and alert cities follow some definite procedure in welcoming new residents, and there are also a number of commercial organizations that specialize in this important work.

The United Gas Corporation together with other business men of Lake Charles, La., has worked out this welcome problem along different and effective lines during the last five years, with the help of the Lake Charles Association of Commerce; the plan has been very successful.

Lake Charles merchants used to write individual letters to new residents in this area, but after a year's experience, they came to the conclusion that while the names on the letters might mean something to the newcomers, they would not read that many letters.

The merchants then switched to a beautiful "Welcome" or "Greeters Book" which contains illustrations, in ads, of the various places of business, each advertisement occupying a minimum of one page. This practice has helped considerably in aiding newcomers to identify various places of business, especially the gas office and gas appliance store.

The Greeters Book page size is 8½ x 11. The advertisement of United Gas Corporation carrying illustration of a modern gas equipped kitchen reads as follows:—

We Eliminate Drudgery from Housework . . .

With natural gas you have no dirt, no delay—service at low cost

A representative of our company will call on you and assist in solving your heating problems—

Let us help you plan an ideal kitchen

With Natural Gas **The Modern Home Becomes Automatic. Gas Is Your Quick, Clean, Economical Servant.**

Phone 2260

United Gas Corporation

The first page of the big Greeters book contains an illustration of the Association of Commerce building, as well as a welcome message from the general manager of the organization. The second page contains a picture of the mayor, and a welcome from him, too.

As a followup, a woman representative of the Association of Commerce, visits the light and gas company, the telephone company and secures a list of the installations. She then contacts these newcomers, spending some time with each one, and giving them in addition to the Greeters Book, such other literature as would be of interest to them. She secures from the customer, or newcomer, present address, business address, former address, type of business and former business connection, as well as church and other affiliation.

She communicates with the ministers of the churches, and furnishes them with information about the newcomer, and she also turns this information in to the credit bureau, from which they can secure a previous record on the newcomer.

Every few days she supplies the contributing merchant with a list of those whom she called on, and it is up to them to follow up these contacts. Later she calls back to determine whether the newcomer has found trading conditions satisfactory, and to secure any complaints or compliments, and these are turned over in due time to the merchants.

This service is paid for by the merchants represented in the book. The association charges an initial fee of $10 for making the cut and printing sufficient pages to last a year, and then the merchants pay an additional charge of $3.00 per month for the service.

At the end of the Greeters Book is a complete list of the members of the Association of Commerce and their businesses, lists of civic and fraternal organizations, churches, as well as the "Facts You Should Know about Lake Charles" section, which tells about the city's commission form of government, and gives the telephone numbers of various city departments, employment services, ambulances, etc.

Technical Books. A 36 page catalog of technical books has just been issued by the Chemical Publishing Co., Inc., New York City. It covers domestic and imported books on chemistry, physics, mathematics, medicine, metallurgy, machinery, engineering, biology, general science, business, manufacturing, formularies and technical dictionaries.

A copy will be sent to anyone interested on receipt of stamps to cover postage.

TITAN WATER HEATER CONTROLS

AGA Approved TITAN Temperature and Pressure Relief Valve

This device is installed on the hot water outlet in the tank directly in the flow of water. Action, as a result, is unfailing and positive, there being no dead pockets to prevent proper functioning of relief valve.

Pressure relief is obtained through a spring-loaded valve which opens when the pressure reaches a predetermined point. Should the water become overheated to 200° F, a fusible disc melts and lets the water escape thereby preventing a further increase in temperature.

The Titan Relief Valve serves as a coupling connected in the line thereby eliminating the necessity and expense of a tee fitting. To replace fusible disc, it is not necessary to disassemble valves or piping in any way.

Designed for application to storage or range boilers. Prevents corrosion, scalding and explosion.

Catalog and full information upon request.

The Titan Valve & Manufacturing Company

Thermostats • Safety Pilots • Relief Valves • Safetystats
9913 Elk Avenue Cleveland, Ohio

Made in 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", and 2" sizes.

You'll Be Better Satisfied with

BARBER Gas Pressure REGULATORS

• For dependability of operation, for positive response within narrow limits of pressure drop, you can rely on precision-made BARBER Pressure Regulators. Only tested principles of design and the finest of craftsmanship and materials go into them. All bronze body—brass working parts. Compact and attractive in appearance, for harmony with modern gas appliance styling. Sizes 1/4" to 1 1/2" certified by A. G. A. Testing Laboratory. For today's top regulator value—*Better Buy Barber!*

Write for complete literature, prices and discounts on the entire line of Conversion Burners, Appliance Burners, Controls and Regulators.

THE BARBER GAS BURNER CO.

3704 Superior Ave., Cleveland, Ohio

Address Michigan Inquiries to The Barber Gas Burner Co. of Michigan, 4475 Cass Ave., Detroit, Mich.

Newly Designed Gas-Fired Winter AIR CONDITIONERS

Three types, just re-designed to include the latest improvements, give the widest range of models and sizes.

The "Aristocrat," in six sizes,—cabinet finished in smooth grey enamel,—has cast iron flue economizer, two-speed motor with over-load cut-off, Automatic June humidifier, Humigrad room control, and many other superior features.

The "Special" is completely equipped with every desirable feature, and priced for the average home.

The "BAC," quality made and further priced to give exceptional value.

Also, the Moncrief Gravity Gas Furnace, highly efficient and economical, same burners and heating sections as Moncrief Gas Winter Air conditioners.

All are approved by the A. G. A.

Write for particulars

The Henry Furnace & Foundry Co.

3484 E. 49th St. Cleveland, Ohio

Industrial Gas Plans For a Boom Year

General view of Conference on Monday, March 27th.

A. G. A. Industrial Gas Sales Conference, Cleveland, Features New Discussion Technique—And Gets Results

175 Attend "Best Yet" Meeting

THE theatre-goer knows that the smash hit winds up with its strongest scenes. It saves its "wallop" for the final curtain. And so it was with the Conference on Industrial Gas Sales staged March 27 and 28 by the Industrial Gas Section of the American Gas Association at the Hotel Statler, Cleveland, Ohio. Undisputed headline act of the meeting was the final feature—something new on sales conference programs—an afternoon of "rotating panel" discussions.

Rotating panel discussions differ from the customary variety in that they are all held in the same great hall and at the same time (although on different subjects) so that those with an interest in two or more fields can move from one to the other at will while the one-trackers can invest all four hours in sharing ideas only in the direction which they esteem will be of greatest profit to them. Another virtue of the rotating panel discussion is that all participants, including the leader, sit informally at a round table. *Everyone* is drawn into the soundest type of plan-making.

At the Cleveland Conference five of the most active Committees of the Industrial Gas Section conducted rotating panel discussions on Tuesday afternoon. The Industrial and Commercial Air Conditioning table drew the largest number of participants (45 at the time of one count) while groups varying from 10 to 25 strong maintained lively discussion at the tables devoted to Ferrous Metals, Non-Ferrous Metals, Ceramics, and Food Industries.

"The best discussion technique yet developed for getting results," "An ideal method for winning the concentrated cooperation of the Industry for the Committee's work of the year", "Perfect for drawing everyone into the fray without digressions and lagging interest", and "Why haven't we been doing it this way for years?", were sample comments at the close. Committee Chairmen Clayton S. Cronkright (Ferrous Metals), Ralph D. Hawkins (Non-Ferrous Metals), George M. Parker (Ceramic Industries), T. W. Halloran (Food Industries), and Charles R. Bellamy (Industrial and Commercial Air Conditioning), who led the discussions, found that their committee's took as much as they gave in ideas and inspiration. It is safe to predict that the "rotating panel" discussion will become an institution at Industrial Gas Sales Conferences.

Save the Customer 25% and Protect the Job Against Oil

Lead off man of the 12 speakers who addressed the Conference during the 1½ days of sessions preceding the afternoon of panel discussions, was O. N. Sellers, Sellers Engineering Co., Chicago. Mr. Sellers produced case history evidence to demonstrate the value of his advice on "Capitalizing On Immersion Tube Boilers and Water Heaters." The engineering improvements incorporated in such equipment, according to this manufacturer, mean that to-

day immersion boilers and immersion water heaters are guaranteed to be at least 80% thermally efficient. Further it is a practical impossibility to convert installations to oil. Therefore, they "offer a means for the gas man virtually to reduce the rate of gas to his customer without such reduction costing the gas company one cent."

In summary it was pointed out, "In so doing (specifying immersion tube equipment) you should be able to save your customers ordinarily 25% or 30% in gas for a given job, and at the same time place equipment which cannot easily be converted to competitive fuels."

Dowtherm—Key To New Markets

A "new tool for the industrial gas engineer in solving the ever increasing problems of industrial process work"—the Dowtherm boiler—was evaluated for sales possibilities by the second speaker on Monday morning, D. A. Campbell, Eclipse Fuel Engineering Co., Rockford, Illinois. He defined the Dowtherm boiler as a high temperature, low pressure, vapor phase heating system, and showed how it could "not only improve and extend the use of gas in industries which now use our product, but carry gas heating into new fields as well." Some six recent installations were described in considerable detail, and numerous others were mentioned in connection with analyses of markets. Several of these were in the chemical process field "where solid and liquid fuels have dominated for years." Others illustrated what could be done with the new equipment by way of invading the paper industry, the plastic moulding field, and the asphalt products business. In one case (varnish cooking) a 50% savings in fuel costs over direct gas firing was demonstrated.

Even More Industrial Rates in the Offing

Shifting the attention of the conference from new industrial equipment with which to court new markets, C. F. deMey, Chairman, A.G.A. Rate Committee, introduced the vital subject of "Practical Rates For Industrial Gas Service." He stressed that the rate man must get the sales viewpoint before he can give proper judgment on rates for any prospective load, and that competitive conditions should certainly be heavily weighed along with costs of delivery.

"We Must Depend Upon OURSELVES"—Whipp

Adjourning to luncheon in the Pine Room, the Conference heard Wendell E. Whipp, President, National Machine Tool Builders Association, and President, Monarch Tool Company, explain that the gas industry and the machine tool business share essentially the same problems and the same objectives. The job is to "produce more goods for more people . . . to render a service to the ultimate consumer. But there has been widespread disagreement as to whether the damage we do does not outweigh the service we render." As a result "many problems must be solved, and first and foremost is the problem of unemployment." To achieve this and other long-awaited ends Mr. Whipp advised "We must forget panaceas, we must realize our responsibility, and we must take stock of ourselves to determine whether our sales approach is shaped to result in real service to our prospects." In conclusion it was stated, "In these days of political confusion, we must depend upon *ourselves*—upon our individual efforts and resourcefulness."

Recirculation Heating—Where and How

Edward Stephenson, Jr., Surface Combustion Corp., Detroit, Michigan, opened the afternoon session by discussing "Recirculating Air Heating for Industrial Furnaces" from the standpoints of the job it does and the way it should be applied. "If the requirements are fast heating, high thermal efficiencies and smaller chambers, then the convection furnace is the answer; for accurate temperature distribution and complete uniformity, only the convection unit will do," observed Mr. Stephenson in referring to heating jobs up to about 1250°F. For quick changes of temperature, also, the method is ideal.

Potential Market for 24,000,000,000 Feet—In Industrial Finishing

Paul J. Ziegelbaur, Pontiac Varnish Co., Pontiac, Michigan, reopened the technical phase of the Conference on Tuesday morning with an enthusiastic endorsement of gas drying for lacquers, japans, and other metal finishes. "Recirculation heating with gas should be employed to the fullest extent," said he. As a technical expert in the finishing field, he proved invalid "every argument that has been advanced by paint men against the use of the recirculating heater", and indicated that finishing costs can be pared down surprisingly by its application. "It is the most nearly trouble-free combination yet found for the heating of ovens. Maintenance costs are lower than with any other heating method. For example, one Detroit plant reports an annual saving of over $8,000 on upkeep alone since replacing oil with gas-fired recirculating heaters."

As for the market, Mr. Ziegelbaur noted that the annual U. S. produc-

(Left) A group at the luncheon on Monday; (Right) Wendell E. Whipp, Pres., National Machine Tool Builders' Association, and Pres. Monarch Tool Co. is addressing luncheon. (Left) C. E. Gallagher, Pres., The East Ohio Gas Co., Cleveland, O. (Right) Frank H. Trembly, Jr., Chairman, A. G. A. Industrial Gas Section.

tion of primers, lacquers, enamels and japans that are baked or force dried is between 200,000,000 and 300,000,000 gallons. If all this were dried in gas heated ovens, the annual gas consumption would amount to over 24,000,000,000 cu. ft. of 530 Btu gas.

Controlled Atmosphere?—Beware Moisture

Diving back into the subject of controlled atmospheres, Dr. Bruce W. Gonser, Battelle Memorial Institute, presented the fruits of his investigations and study on "The Present Status of Prepared Atmospheres in Industrial Heating." Current practice can be broken down into seven classifications of methods for preventing undesirable attack (principally scaling and decarburization) of heated materials. These classifications were defined and the methods described, charts and research findings being employed to evaluate the effectiveness and merits of each group. "Water vapor in the furnace atmosphere is the principal trouble-maker in practical applications," cautioned Dr. Gonser. In conclusion, he showed typical gas generating equipment of different kinds.

"Gas For All Industrial Heating Jobs"

I. Lundgaard, Rochester Gas & Electric Corp., Rochester, N. Y., offered views on "Selling Industrial Gas—And At A Profit." His contention that "It is only by interpreting the value of gas in relation to its effect on a chain of other processes that gas can be sold at a profit" was premised on the observation that "The opportunities to sell gas at a profit as a 'mere fuel' are decidedly limited." Dominant suggestions were that the industrial gas salesman keep his eye on *net* load value rather than estimated annual revenue, and that gas-saving engineering such as recuperation or regeneration be sold to the customer for his and ultimately the gas industry's permanent benefit. Future progress will be more controlled by the thoroughness with which we sell old customers, he also indicated, than by the finding of new customers. Selling gas for *every* heating job in a customer's plant is one key to success. He recommended the industrial sales slogan, "Gas for All Heating Jobs."

Insulating Refractory. Bulletin 320-D of Quigley Company, 56 West 45th Street, New York, tells of the properties and applications of "Insulcrete," a light weight insulating refractory concrete. May be used for direct exposure to flame and furnace gases up to 2500° F.

Selling Hot Water*

By Harry M. Hitchcock

One of the oldest and soundest rules in selling is: Don't sell 'em the thing itself; sell 'em what it's good for. You don't sell radios; you sell entertainment. You don't sell flour; you sell cakes and pies and muffins and get 'em so hopped up about how good they are, that they go out and *buy* the flour.

Well, what is hot water good for . . . hot water in the home? Anybody knows the answer to that. Hot water and soap belong together just as firmly as ham and eggs, toast and coffee, waffles and syrup. And one word covers the whole story . . . *cleanliness.* Sell *cleanliness* . . . and your industry, and ours, will profit by an immense new market opportunity.

Perhaps you are asking, under your breath, why cleanliness *needs* to be sold; or to put it another way, how far cleanliness can be *sold.* And right there is the very important point about which men engaged in selling must constantly remind themselves.

You and I live and move and have our being on a social level at which cleanliness is taken for granted. We would probably be offended if anybody suggested to us that we weren't personally quite as fastidious as we should be.

But neither of those things is true of a vast number of people . . . millions of them . . . who are just as good present and prospective customers for hot water heaters (and for soap and towels and nail-brushes and disinfectants and new bathrooms and so on) as the more sophisticated tenth or twentieth of the population.

Everything our Association, through its Cleanliness Bureau, has done and is still doing, only confirms the fact that with all we've done there is still an immense undeveloped market, right here in this country, for all those appurtenances of civilization that you and I are in the habit of taking for granted . . . toothbrushes and toothpaste, modern bathrooms, soap and towels and brushes . . . and HOT WATER.

* *From an address delivered at the annual meeting of the Gas Section of the Wisconsin Utilities Association at Milwaukee, Wisc., March 14. Mr. Hitchcock is a member of the staff of the Association of American Soap & Glycerine Producers.*

HOT WATER ALL GONE!
CLOTHES WON'T COME CLEAN!
WASHED OUT AFTER WASH DAY!
IT CAN'T HAPPEN HERE
WHEN THERE'S PLENTY OF HOT WATER FROM AN AUTOMATIC GAS WATER HEATER
Wash day is one day when the hot water supply becomes doubly important. It can "make or break" your laundry — and you too. Make sure that you have the dependable modern hot water service supplied by an automatic storage gas water heater on wash day and every day. Special sale now will save you $14.00 on the 24-gallon size. Convenient payments, too.
The Gas Company
GAS DOESN'T COST ... IT PAYS!

THE STORY OF MORE THAN A MILLION KITCHEN EXECUTIVES
Gas Refrigeration Brings Big Savings To The Kitchen Budget
More than a million housewives testify as to the three big savings that Servel gas refrigerators have brought to them. They have saved on food, on operating costs and on maintenance expense. The gas refrigerator operates silently, freezing without moving parts to wear out. Its tiny gas flame costs less than two cents a day to operate. On our easy terms you can pay for your Servel as little as $4.93 a month — less than 17 cents a day.
SERVEL
The Gas Company
GAS DOESN'T COST ... IT PAYS!

Two of an excellent and comprehensive series of newspaper advertisements which cover "gas for all four" services used by The Ohio Fuel Gas Company of Columbus. The above were used recently in 2 column, 7½ inches high and 3 column. 12 inches high.

Hollywood Food Fair, Municipal Auditorium, Kansas City, Missouri, March 26 to April 1, 1939

Appliance Promotion in the Kansas City Trade Area

by
John Beall
Kansas City, Missouri

THE Kansas City Gas Company, this spring, has been aggressive in its promotional activity along the lines of gas appliances for use in the home.

The "Better Homes Show," an exhibition of new building, furnishing methods and merchandise, attended by 105,000 paid admissions during the week beginning February 25, and the "Hollywood Food Fair," an advertising and demonstrating food exhibit visited by 110,000 paying customers during the week beginning March 26, served as notable vehicles for the promotion.

The gas appliance display was one of the dominant features of the "Better Homes Show," extending 40 feet and displaying four different classes of appliances, namely ranges, refrigerators, water heaters, and forced air furnaces.

A modernistic canopy covered the gas display, furnishing a unity to the exhibit. Cut-out letters mounted on top of the canopy identified the booth as that of the Kansas City Gas Company. In the center of top edge appeared a large circular design, illuminated from behind, and reading simply, GAS. Also running the full length of the top of the canopy large letters presented the theme of the exhibit, "Gas for the 4 Big Jobs . . . Cooking, Refrigeration, Water Heating, House Heating."

Partitions within the booth itself separated the four groups of appliances.

The modern aspect of the gas range with its fast broiler oven and high speed oven for cooking perfection was demonstrated to interested men and women by members of the utility's home economics department in actual cooking. Three makes of ranges were used in the better homes booth—Magic Chef, Roper and Detroit Jewel.

Two sizes of Electrolux refrigerators, featuring the usual features of gas refrigeration, silence, no moving parts and lowest cost of operation were dramatized on the booth background with attractive sign panels and a photo-mural of a winter scene pictorializing the fact that gas Electroluxes make ice as silently as nature. The boxes were connected for a more convincing sales presentation.

A third booth contained two A.G.P. 30-gallon gas water heaters. An impressive background set off this otherwise rather colorless equipment. The center of the background was composed of a tilted conventional water faucet so lighted as to appear as releasing steaming-hot water.

The fourth booth contained a Surface Combustion conversion burner, and A.G.P. forced air Gas Furnace, and a 20-gallon Pittsburg water heater. The background of this phase of the exhibition included a photo-mural showing a gentleman setting a thermostat. Lettering tying in with the mural read, "An Automatic Heat Control Tends the Furnace in a GAS Heated Home."

Each booth was manned at all times during the week by salesmen of the appropriate division of the sales department.

The only likeness of the gas exhibit in the "Hollywood Food Fair," to that of the better homes exhibition was the canopy.

The theme was "Modern Gas Ranges & Gas Refrigerators are as new as the World Fairs." The great emphasis here was on ranges. Water heaters and gas furnaces were excluded.

An original oil painting of an artist's impression of a panorama view of the New York World's Fair, is the central theme of the first booth, giving a key note to the modern gas range. A small model of the sphere and trylon also is on a table in the booth.

Cellophane wrapped Easter cakes baked in gas ranges by the home economics women also gave an atmosphere of the spring season. A Magic Chef and a Detroit Jewel occupied this booth.

The next partition embodied demonstrating ranges bearing the trade marks, Magic Chef and Roper. Better cooking results was the feature-theme of this booth. Photo murals

Better Homes and Building Exposition, Municipal Auditorium, Kansas City, Missouri, February 25 to March 4, 1939

in color of delicious dishes added to the appeal and a larger mural of a complete modern gas kitchen rounded out the striking background.

A third booth was taken up with Electrolux Refrigerators of two different sizes. The background attracted much attention as it was a color photo-mural of Translite which shows brilliant true colors when lighted from behind. It was a picture of a midnight ice-box raiding party by a pretty young wife and handsome husband. A circular panel emphasized the low operating cost of gas refrigeration by stating that 45c per month often is the extent of the gas bill for the Electrolux.

The last booth, but one which held equal prominence with the others, was taken up with the question of easy cooking on the gas range. Illuminated Translite color photo-murals of another modern gas kitchen and tempting pictures of gas cooked food formed the background of the Roper and Detroit Jewel.

After a demonstration of food preparation in new ways the demonstrators passed out recipes of the work just completed.

The direct selling aspect of the promotion was certainly not overlooked for from four to eight of the forty utility salesmen were on duty at the exhibit during the show hours which extended from 1:30 P. M. until 10:30 P. M. each day for the week.

A number of outright sales were made during each of the two shows and many many prospects were obtained to keep the salesmen busy on follow-up work well into the summer.

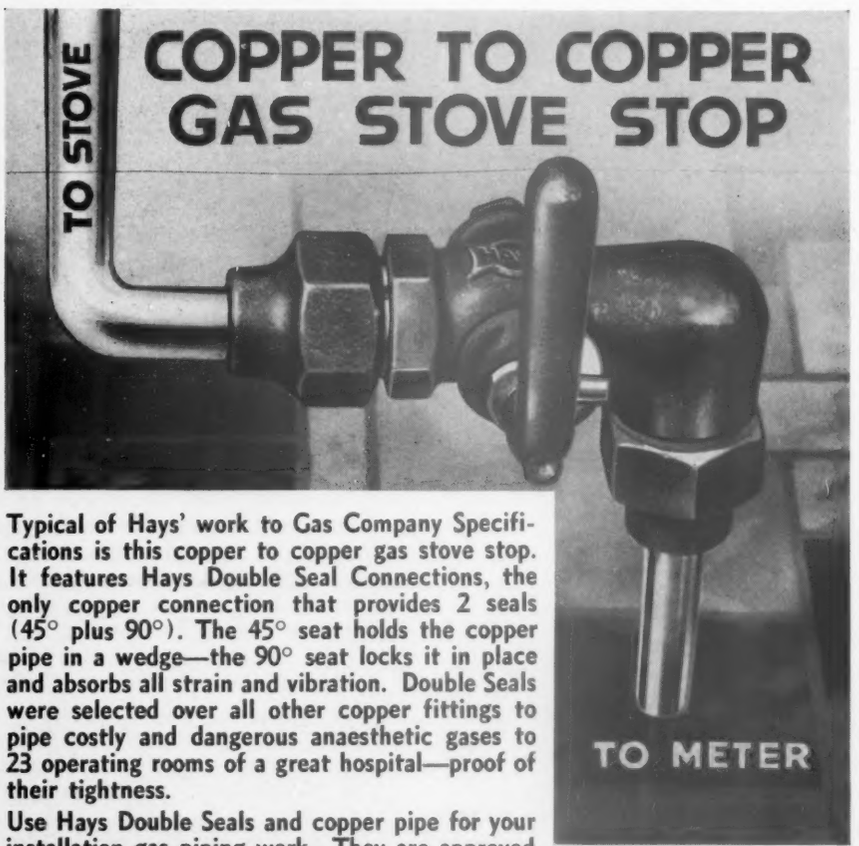
It was considered successful from the standpoint of public education and from the standpoint of sales.

"Three Keys To the Modern Basement" is the title of a 20-page, illustrated book on modernizing the basement, prepared by The Bryant Heater Company, 17825 St. Clair Avenue, Cleveland, Ohio, after considerable research and study on the subject. The suggestions it contains are practical and easy to follow in transforming the basement into a livable and attractive room.

The three keys: where to begin . . . what to do . . . and how to do it, "unlock your basement for greater usefulness." Building furniture and games, the treatment of floors, doors, and windows, making stairways attractive, and many other helpful suggestions are incorporated in this book which is dedicated to the Homeowners of America. This Bryant Basement Book is available upon request at the nominal cost of 10c each, postpaid.

Water Heaters. The complete line of "Hotstream" water heaters and accessories are fully illustrated and details given in a 34 page bulletin No. 39. Prices as well as useful tables and curves are included. Copy obtainable from The Hotstream Heater Co., 8007 Grand Ave., Cleveland, Ohio.

Protective Coatings. Metal coatings for Gas Holders, Stacks, Scrubbers, Condensers and other gas plant equipment are described in Quigley Triple-A bulletin C-284. Copies available through Quigley Company, 56 West 45th St., New York.



Typical of Hays' work to Gas Company Specifications is this copper to copper gas stove stop. It features Hays Double Seal Connections, the only copper connection that provides 2 seals (45° plus 90°). The 45° seat holds the copper pipe in a wedge—the 90° seat locks it in place and absorbs all strain and vibration. Double Seals were selected over all other copper fittings to pipe costly and dangerous anaesthetic gases to 23 operating rooms of a great hospital—proof of their tightness.

Use Hays Double Seals and copper pipe for your installation gas piping work. They are approved by Underwriters' Laboratories. Write for catalog.

HAYS MFG. CO., ERIE, PA.

New Jersey Gas Association Convention

The Twenty-eighth Annual Convention of the New Jersey Gas Association was held on April 12th at the Berkeley-Carteret Hotel, Asbury Park, N. J., with an attendance of approximately 800.

Mr. B. A. Seiple, President of the Association and Vice-President of Jersey Central Power and Light Company welcomed the members and guests to Asbury Park and also made his Presidential Report.

Major Alexander Forward brought greetings from the American Gas Association, and then introduced Mr. Conrad N. Lauer, President of A. G. A., who gave a particularly timely and interesting talk on some of the present problems and developments in the gas industry.

A feature of the morning session was an address by Billy Van on "Yankee Adaptability in the Gas Industry." This quaint philosopher, who believes in putting his thoughts into practice, departed rather far from the specific subject assigned to him; but he did tell how industries in the little New England town from which he comes had adjusted themselves and carried on with a new product when changed conditions had taken away the market for the product they originally made. By inference the gas industry must be prepared to meet a changing market by adapting itself to the times.

The morning session concluded with the presentation of McCarter and National Safety Council medals by Mr. H. W. Nicholson, Public Service Electric and Gas Company, to the following:

McCarter Awards

1. **Bar: William Grunewalder, 1025 McCarter Highway, Newark.**
2. **Medal: Waldo Simonson, No. Park Street Gas Shop, East Orange.**
3. **Medal: John Frank Rodmaker, And Certificate of Assistance to Henry Jensen. Both of 1025 McCarter Highway, Newark.**

President's Medal of the National Safety Council

4. **Medal: James McGrath, 1025 McCarter Highway, Newark.**
5. **Medal: Thomas Chamberlain, Camden Coke Plant.**

At the afternoon session there were the following papers:

Officers of the New Jersey Gas Association

President, G. B. Webber, Newark
First Vice President, F. H. Darlington, Glassboro
Second Vice President, P. D. Gardner, Camden
Secretary-Treasurer, H. A. Sutton, Newark

"New Jersey's Gas Industry and the New York World's Fair," presented by Mr. J. P. Leinroth in the absence of Mr. H. P. J. Steinmetz, Vice-President in Charge of Sales of Public Service Electric and Gas Company.

"Your Balance Sheet,"—a discussion of personal qualities and characteristics that make for success or stand in the way of it, presented by Miss Hilda M. Torrop.

"Profiting by Customer Complaints," presented by Mr. L. R. Quad of Public Service Electric and Gas Company, who showed that, while only a small percentage of complaints are due to a just cause, yet a study and analysis of all complaints are of very great value in enabling a company to prepare approved methods of handling the various types of complaints and thus gain a maximum of public good will.

At the beginning of the afternoon session Miss Mary N. Hall, Chairman of the Home Service Committee placed a dinner in the oven and on the top burners of a C/P range. At the close of the session, after an inspirational talk on the C/P range by Mr. R. S. Agee of the A.G.A.E.M., the dinner was removed perfectly cooked.

The C/P range used in the demonstration was awarded by lot, and was won by Mr. Jacob Loos of West New York, an employee of Public Service Electric and Gas Company.

A banquet and entertainment concluded the very successful convention.

The appreciation of the Association to Mr. B. A. Seiple, the retiring President for his able and successful administration of its affairs during the past year was expressed in the form of an appropriate gift.

PIONEERS

in the manufacture of

RE-CHROME METER LEATHER

For the Gas Industry

Our leather has proven far superior to any substitutes which have been proposed or tried for gas meter diaphragms. It is strong and pliable.

"COLONIAL BRAND"

Will stand up in the Meter under all variable conditions—heat, cold or dampness, without affecting the diaphragm in any way.

We also tan leather for Iron Meters, Governors and Regulators.

BESSE, OSBORN & ODELL, INC.

65 South St., Boston, Mass.

Tanners of "Colonial Brand" Oil and Re-Chrome Meter Leathers

New York Representatives

Bankart & Samuelson

177 William Street, New York City

Candid camera shots at Distribution Conference. Left to right:—G. F. Mitchell, Chicago; Alexander Forward, New York; W. E. Nichols, Hammond, Ind.: A. T. Barrett, Chicago; R. M. Schaffer, Hammond, Ind.; C. J. Gregg, Bradford, Pa.; F. M. Goodwin, Boston; Chas. Turner, Cleveland.

Distribution Conference

American Gas Association

The sixteenth annual Distribution Conference was held at the Palmer Hotel, Chicago, Ill., April 17, 18 and 19, with C. F. Turner, Cleveland, O., chairman, presiding. The attendance was over 400—larger than that of any previous meeting.

It is interesting to note here that the idea of such a conference was originated with J. D. Von Maur when he called together a few distribution engineers at a meeting in Toronto, Ontario, in 1924.

G. F. Mitchell, President, Peoples Gas Light & Coke Co., Chicago, welcomed the delegates to the meeting and Alexander Forward, Managing Director of the American Gas Association made a short address.

T. J. Perry, Brooklyn Union Gas Co., Brooklyn, N. Y., presented the first paper entitled "The Importance of Proper Servicing." Mr. Perry stressed the point that servicing appliances today is a skilled trade, and service men should be specially trained for the job. He stated that servicing appliances should be approached with the main object of building the gas load—sales minded for load building.

The paper "Indiana Gas Association Servicing Committee's Preparedness Program on CP Gas Ranges," presented by J. M. Pickford, Northern Indiana Public Service Co., Hammond, Ind., outlined the activities of the Appliance Servicing committee in co-operation with the Sales Committee. Test methods were explained, and results of various ones were given. Summary tables were included in the paper.

Miss Jeanette Campbell, The East Ohio Gas Co., Cleveland, O., read a paper entitled "Appliance Servicing from a Woman's Viewpoint." This paper will be found elsewhere in this issue of the JOURNAL.

On Tuesday morning J. Woodward Martin, Lone Star Gas Co., Dallas, Texas, read a paper outlining the activities of his company in selling Propane gas in the territory beyond their pipe lines. The paper is included in this issue of the JOURNAL.

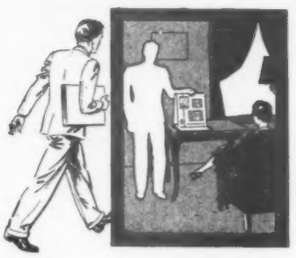
A. V. Smith, the United Gas Improvement Co., Phila., Pa., presented the report of the Pipe Coating and Corrosion Committee, and Dr. Scott Ewing outlined research going on at the National Bureau of Standards. K. R. Knapp, A. G. A. Testing Laboratory, outlined and showed with slides the methods of testing appliances and accessories.

"A Method of Prognosticating Meter Errors" was title of a paper by H. S. Harris, Southern California Gas Co., Los Angeles, Calif., and the Report of the Committee on Meters and Metering, was presented by A. W. Turner, Chairman, Consolidated Edison Co. of New York.

Various committee reports were presented Wednesday forenoon, and the afternoon session was devoted to an open forum on the following subjects — Construction, Maintenance, Installation and Servicing, Appliances, Meters and Metering.

More camera shots at Distribution Conference. Left to right:—L. J. Willien, Chicago; O. R. Allgeier, Webster Groves, Mo.; V. C. Hoddick, Rochester, N. Y.; R. L. James, Harrisburg, Pa.; H. W. Parker, Allentown, Pa.; T. V. Flynn, Philadelphia, Pa.; W. H. Bettle, Newark, N. J.; Joe Hopper, New York.

STEP INTO THE PICTURE



AND MAKE MORE SALES . . . WITH THE COMPLETE PITTSBURG LINE OF AUTOMATIC WATER HEATERS

- **STORAGE MODELS**
  7 sizes with Galvanized Tank.
  Capacities 7½, 15, 20, 30, 40, 50 and 75 gallons.
  5 sizes with Copper Tank.
  Capacities 20, 30, 40, 50 and 75 gallons.
- **LIQUEFIED PETROLEUM HEATERS**
  4 sizes with Galvanized Tank.
  Capacities 20, 30, 40 and 50 gallons.
- **MULTICOIL STORAGE SYSTEMS**
  4 sizes with Galvanized or Copper Tank.
  Capacities 80 to 5,000 gallons per hour.
- **CONTINUOUS FLOW HEATERS**
  7 sizes—Copper Coil Type.
  Capacities 1½, 2, 2½, 3, 4, 6 and 8 gallons per minute.
  2 sizes—Fintype, Preheater.
  Capacities 2½ and 4 gallons per minute.
- **TANK HEATERS**
  5 sizes—Copper Coil, Cast Iron Jacket.
- **HOUSE HEATING SYSTEMS**
  Full capacity to 555 sq. ft. of direct cast iron radiation.

EVERY SIZE AND TYPE OF HEATER FOR EVERY CONCEIVABLE REQUIREMENT

PITTSBURG
WATER HEATER CORP.
PITTSBURGH, PA.

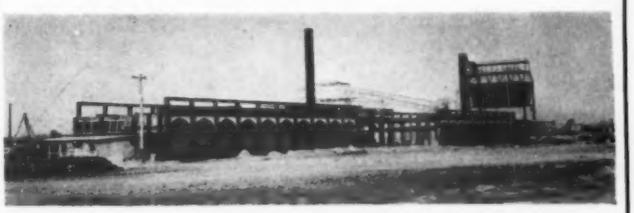
CURRAN-KNOWLES GAS AND COKE OVENS

Successfully carbonize Low Volatile, High Volatile, Swelling or Non-Swelling Coals.

Give a high yield of superior quality coke for water gas generator fuel, industrial and domestic use; a high yield of tar of excellent quality and a uniform quality of gas which meets Commission requirements.

Substantial construction. Low initial cost per M. capacity. Low operating cost due to simplicity of design.

Built to suit any situation. Over 5 years' successful operation.



The Midwest Smokeless Fuel Co. Plant near Millstadt, Ill., now nearing completion.

Ask for bulletins showing plants and products.

COAL CARBONIZING CO.
Bank of Commerce Bldg. St. Louis, Mo.

Take No Chances!
ALWAYS SAY "K-CO"

"K-CO" is the trade mark found on all high grade Gas Stops made by Kitson. By it you identify products *guaranteed* for ease of operation and freedom from leakage. By always specifying "K-CO" you assure perfect performance.

New Catalog free on request.

G-201—Flathead Standard Gas Stop

KITSON COMPANY
2409-15 Westmoreland St., Philadelphia, Pa.
Manufacturers of Kitson Safety Devices (Lovekin Patents) for Domestic Water Heaters . . . Quality Brass Goods for Gas, Water and All Plumbing Uses.

CRUSE-KEMPER COMPANY

STEEL PLATE CONSTRUCTION

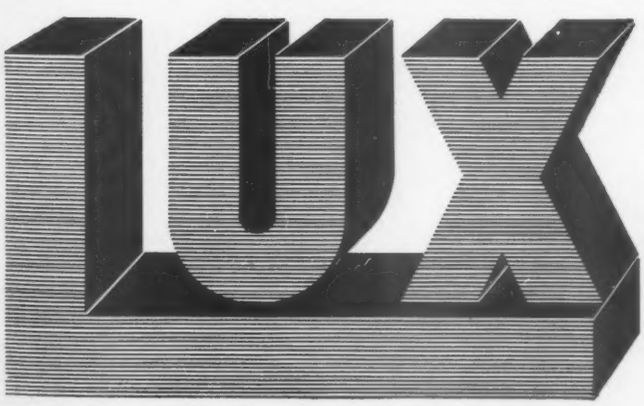
AMBLER, PA.

GAS HOLDERS

HOLDER INSPECTION

RIVETED OR WELDED FABRICATION & ERECTION

TANKS, BINS, FLUES PURIFIERS, WELDINGS



The COLLOIDAL *Oxide*

LUX is manufactured by a controlled chemical process which guarantees that it is always constant in quality.

The state of fine division of LUX provides an enormous surface area to flow of gas.

LUX-MATERIAL & LUX SPONGE *for* Prompt *shipment.*

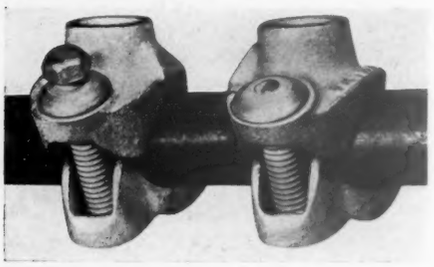
THE ALPHA-LUX COMPANY, Inc.
192 FRONT ST., NEW YORK
Philadelphia **Chicago**

New Equipment

Tamper-Proof Saddle Tee

The Skinner-Seal Saddle Tee made by M. B. Skinner Company, South Bend, Indiana, for installing gas appliances, can now be secured optionally, at slight extra cost, fitted with an ingenious Self-Locking Bolt which also acts as an automatic gauge of the proper tension the bolt should have applied to it.

The bolt is fitted with a round button head and a half ball recessed nut. Above the head of the bolt, connected to it by a neck of a definite diameter is a secondary hexagon head which when tightened to a pressure of thirty foot pounds breaks off at the neck, leaving the button head only which cannot be gripped with a wrench or pliers due to its shape.



Skinner Saddle Tee

The half ball recessed nut at the other end also furnishes no chance for a grip, and so the bolt acts as a lock—preventing unauthorized removal, after once installed.

Furnished either with conventional lead gasket or fireproof Neoprene and asbestos gasket riveted in place, at the same price.

Portable Explosion-Proof Lamp

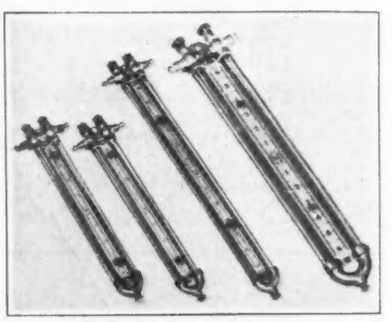
This lamp is fully protected, and where the light is emitted, duplate safety glass, one quarter of an inch thick is used, which if broken will not shatter or allow gases or vapors to enter. The hook with a two inch opening is adjustable so that the light can be focused where desired and no light is thrown in the users eyes. Materials used are non-sparking, the head being cast aluminum and the handle turned rolled Bakelite. The rugged and simplified construction is such as to withstand severe service. Since the light is concentrated, a 50 Watt rough service lamp gives more than the light of present portables. Weighs less than three pounds. Made by Ericson Manufacturing Co., 5716 Euclid Ave., Cleveland, Ohio.

Connelly Manometer

The Connelly Iron Sponge & Governor Company, 3154 S. California Ave., Chicago, Ill., and 200 S. Second St., Elizabeth, N. J., have recently announced an Improved Universal U Gauge or Manometer, designed for portable or stationary use, either as a pressure or differential gauge.

Connelly Universal Gauges are available with both ⅜" and ⅝" tubing, in a wide range of sizes, plain or fitted with valves for portable use and as a differential gauge. Specially constructed models are also available for use as Mercury gauges.

Among the features claimed for these new gauges are—tubing fitted with standard pipe threads—needle valves at top retain fluid for portable use, full protection for tubing which will withstand 100-lb. pressure, easily read graduated scale of etched metal movably attached for zero adjustment with convenient drain valve at bottom of gauge.



Connelly Manometers

Fuller description and prices in Bulletin No. 401-B-1

Combustible Gas Indicator

Johnson-Williams, Ltd. of Palo Alto, California, announce their new Model "F" Combustible Gas Indicator which is essentially their Model "C" reduced more than half in weight and size, and much reduced in price. Like the Model "C", it carries the approval of the Inspection Department of the Associated Factory Mutual Fire Insurance Companies.

The instrument has been so re-arranged that inspection and maintenance is greatly simplified. The weight of the new model is only 6¼ pounds and the size is 3¼" x 7¾" x 6", the instrument hanging flat against the operator.

Another improvement for gas work is the Range Multiplier Cock, having built into it ratios of both 10:1 and 20:1. The multiplier is brought into play by turning the handle of the sample cock to the proper index. With the 20:1 range multiplier in use, pure natural gas may be drawn into the instrument and still the reading will be within the limits of the indicator meter scale.

Illustration shows general view of Model "F" assembly without meter guards and equipped with tubing nipple for sampling hose in place of standard union connection sampling cock.

Combustible Gas Indicator

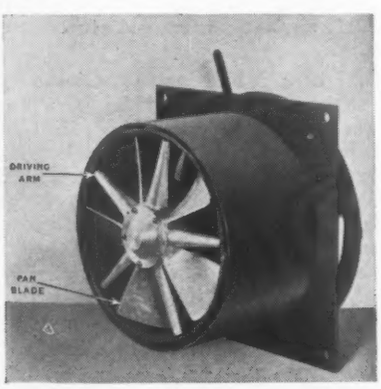
and Appliances

"Fanmix" Gas Burner

Coppus Engineering Corporation of Worcester, Mass., manufacturers of steam turbines, blowers and air filters, are introducing a new line of gas burners, representing a revolutionary change in gas burner design.

Whereas heretofore all gas burners could be classified in three groups, the venturi type, the ring type and the center fired diffusion type, the Coppus-Dennis "Fanmix" gas burner uses an entirely different principle.

It is a rotary gas burner consisting primarily of a fan which rotates on a stationary shaft and which serves at the same time as gas inlet pipe. The gas is admitted through the hollow shaft and enters the fan hub. The fan has several



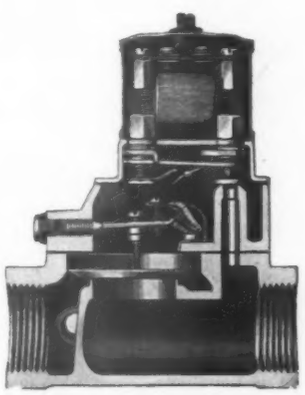
Fanmix Burner

air blades as well as driving arms. The gas flows into these arms, leaves them through small orifices and, by reaction, causes the fan to rotate at high speed. The fan blades then act as any other power driven fan, delivering air for combustion. As the air flows in a direction parallel to the shaft and the gas flow is in a plane practically at right angles to the air flow, a thorough mixture of gas and air is obtainable directly at the fan.

The number of orifices in the driving arms as well as the gas pressure determines the total amount of gas flow and its reaction force determines the speed of the fan and hence the air delivery. It is primarily a high pressure burner, operating at gas pressures of 5 lb. to 40 lb. Bulletin on request.

Slow Acting Gas Valves

New slow-opening type Gas Valves are announced by Julien P. Friez & Sons, Division of Bendix Aviation Corporation, Baltimore, Maryland. These valves provide a soft ignition at low flame followed by a gradual opening to full flame.



Friez Valve

They incorporate a snap primary flow of adjustable volume, a hesitation period, allowing time for uniform draft to be established, followed by slow opening to full capacity. The closing cycle is snap-acting.

They are made in two sizes—¾" and 1" Pipe Tap—and operate on 20 volts.

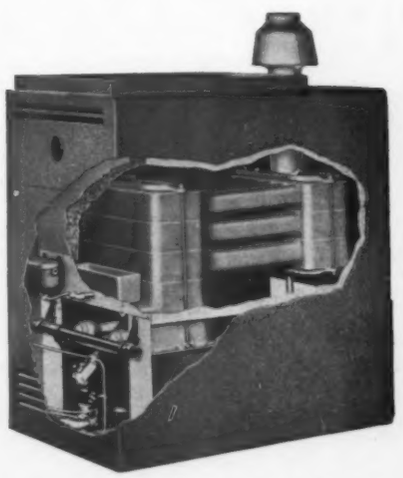
Bryant Gravity Furnace

The adjoining cut shows the Bryant Model 85-GF-55 Furnace. The **cast-iron,** tubular design of the heating section contributes much to the efficiency and long life of this gravity furnace. The cross-section shows how this section is streamlined to secure maximum "brushing" effect of the air flow.

This Furnace is constructed with an inner casing which adds to the over-all efficiency of the furnace by reducing heat losses into the basement. The outer casing is finished in standard Bryant Blue crackle. Guiding its operation, and directing and ordering the fuel supply, are Bryant's gas-actuated controls, standard for over 20 years on Bryant equipment.

There are six sizes to meet the requirements of any climate with input ratings from 50 M. to 170 M. BTU per hour.

An Automatic Humidifier Pan, designed to fit the furnace, is available as optional equipment.



Bryant Gravity Furnace

Featherweight Boring Tool

For underground pipe installation, a new boring tool has been developed for small service crews by Hydrauger Corporation, 116 New Montgomery St., San Francisco. Built on exactly the same principle of its larger forerunners, it offers many added advantages and features. Lighter in weight and more compact, it can be readily operated by one or two men. Due to its low air consumption it requires only the use of a small compressor, thereby avoiding the necessity of moving large crews, equipment and compressors to small jobs.

It is so designed and constructed that it will fit the small space between the curb and the sidewalk. Practically no ditching is necessary under this method of pipe laying. Its greatest benefits are realized on such work as: drilling under streets, highways, railroad tracks, gardens, lawns, inlaid sidewalks, embankments, buildings, etc.

It will open clean holes, 2 inches in diameter up to 40 feet long. Over this distance it can be aimed to hit a sighted mark with great accuracy. The boring bars are driven by a high speed air motor, and by means of a small high pressure stream of water circulating through the hollow drill stems, the cutting edges are kept cool and well lubricated. In addition to this, the borings are washed back and the hole "mudded" to prevent sloughing of the walls.

News of the Industry

1939 New York—New Jersey Regional Gas Sales Conference

The 1939 Regional Sales Conference, sponsored by the Commercial Section for the States of New York and New Jersey will be held at the Hotel New Yorker on Thursday and Friday, June 1 and 2. Evenings are open for attendance at World's Fair.

Mr. J. P. Leinroth, Public Service Electric and Gas Company, Newark, New Jersey, is Chairman of the council in charge.

Among the topics to be covered at the morning and afternoon sessions on these days are: Trends in Residential Consumption and Their Significance; Gas at the 1939 New York World's Fair; a Symposium on Housing; Water Heating; Training Salesmen; The Swing to Gas Refrigeration; Home Heating; Meeting Competition with C/P Ranges; and a Home Service playlet.

Among those invited to address the conference are: Messrs. C. E. Paige, President, Brooklyn Union Gas Company; John B. Reid. Co-Chairman, A.G.A. Committee on Market and Economic Research; Hugh Cuthrell, President, Gas Exhibits, Inc.; Editors of Architectural Forum and American Builder; representative of the Federal Housing Administration; several builders utilizing gas for the four big jobs in their home developments; R. A. Lawder, Consolidated Edison Company of New York, Inc.; B. A. Seiple, Jersey Central Power and Light Co.; Harold F. Coleman, The Brooklyn Union Gas Company; H. S. Christman, The Philadelphia Gas Works Co.; H. G. Schaul, Westchester Lighting Co.; and O. F. Flumerfelt, Vice-President, Iroquois Gas Corporation.

A.S.H.V.E. Meets at Mackinac in July

The Michigan and Western Michigan Chapters of the American Society of Heating and Ventilating Engineers will be hosts for the Semi-Annual Meeting 1939, which is to be held at Mackinac Island, Mich., July 4-6. Headquarters will be at the Grand Hotel.

The Committee on Arrangements hopes to provide a summer meeting of outstanding interest and enjoyment. Working under the direction of the General Chairman, W. G. Boales, are F. J. Feely of Detroit, who will be Chairman of Activities on board the S. S. South American; O. D. Marshall of Grand Rapids, who will be Chairman of Activities on Mackinac Island; and Tom Brown of the Illinois Chapter, who will be Chairman of Activities on the S. S. North American.

CONVENTION CALENDAR

May

8-9 *Indiana Gas Assn.* 29th Annual Convention, Ft. Wayne, Ind.

8-11 *American Gas Association.* Natural Gas Section, Tulsa, Okla.

12 *New England Gas Assn.* Operating Division, Hotel Bond, Hartford. Production and Distribution Sessions.

22-24 *American Gas Assn.* Joint Production and Chemical Committee Conferences, — Technical Section, Rochester, N. Y.

22-23 *American Gas Assn.* Hotel, Restaurant and Comm. Sales Conference, Hotel St. George, Brooklyn, N. Y. In charge; F. B. Herty, Brooklyn Union Gas Co.

24-26 *Assn. Gas Appl. & Equipt. Mfrs.* Roosevelt Hotel, New York, N. Y.

June

1-2 *Natural Gas & Petroleum Assn. of Canada* General Brock Hotel, Niagara Falls, Ont.

1-2 *New York-New Jersey Regional Gas Sales Conference,* Hotel New Yorker, New York.

6-7 *Canadian Gas Association,* Annual Convention, Royal Connaught Hotel, Hamilton, Ont. Secy-Treas. G. W. Allen, 7 Astley Ave., Toronto 5, Ont.

9 *Empire State Gas & Electric Assn.* Group Meeting (Gas Operating) Tower Club, Park Central Hotel, New York.

29-30 *Michigan Gas Assn.* Annual Convention, Grand Hotel, Mackinac Island, including July 1.

August

22-25 *Home Service Conference and Training Course A.G.A.* Los Angeles, Chapman Park Hotel.

September

4-9 *Pacific Coast Gas Assn.* 46th Annual Convention Fairmont Hotel, San Francisco.

9 *Gas Industry Day,*—Golden Gate Exposition.

October

9 *Gas Industry Day,* — New York World's Fair.

9-12 *American Gas Assn.* Annual Convention, New York, N. Y.

Annual Convention A.G.A.E.M.

A tentative program for the annual convention of the Association of Gas Appliance and Equipment Manufacturers to be held at the Roosevelt Hotel, in New York, May 24-25-26, has been announced by Lucian Kahn, chairman of the Association's convention program committee.

E. R. Guyer, of Chicago, president of the Association, will welcome the delegates at the first general session at 10 A.M. on Wednesday, May 24th. At this session, R. S. Agee, sales promotion manager for the Association's domestic gas range division, will discuss sales promotion and its application to the gas appliance industry.

Beginning at 11 A.M. on Wednesday, the various product divisions will hold individual meetings under the chairmanship of their respective chairmen.

The principal speaker at the Thursday morning session will be the Honorable H. Styles Bridges, U. S. Senator from New Hampshire. He will address the manufacturer members on current legislative trends and how they are affected by national and international events.

Friday's (May 26th) general session will be held in the Gas Industries Building at the New York World's Fair. There in the "Court of Flame" Hugh H. Cuthrell, president of Gas Exhibits, Inc., will welcome the convention delegates and outline the predominant part that the gas industry is playing in this great international exposition. At this final session, Saul Cohn, president of the National Retail Dry Goods Association, will speak.

The closing event of this year's convention will be a luncheon to be given for delegates and their wives in the "Court of Flame" Restaurant in the Gas Industries Building at the Fair.

The general program has been so planned as to eliminate any afternoon sessions thus giving visiting delegates an opportunity to visit the World's Fair and to view New York's numerous scenic points of interest.

The convention program committee, of which Mr. Kahn is chairman, includes:

F. E. Sellman, of New York, vice-president of Servel, Inc.; E. C. Adams, president, Adams Brothers Manufacturing Co., Pittsburgh; T. T. Arden, sales manager, Milwaukee Gas Specialty Co., Milwaukee, Wisc.; R. L. Clewell, of the National Radiator Corp., Montclair, N. J.; J. Scott Fowler, president, Lovekin Water Heater Co., Philadelphia; Philip S. Harper, president, Harper-Wyman Manufacturing Co., Chicago; Merrill N. Davis, executive vice-president, S. R. Dresser Manufacturing Co., Bradford, Pa.; W. P. Hutchinson, president, Sprague Meter Co., Bridgeport, Conn.; W. P. Smith, vice-president, Continental Water Heater Co., Los Angeles, Cal.

The Executive Board American Gas Association Visits The Cleveland Laboratories

The March 29th meeting of the Association's Executive Board was held at the Testing Laboratories in Cleveland. This was followed by an inspection trip through the building where various appliances and accessories were viewed under test and current research activities observed. The accompanying photographs were taken during the course of the inspection. (On the left):— Demonstration of method of measurement of warm air temperatures from floor furnaces; (On the right):— Dr. F. E. Vandaveer demonstrating research investigations on central heating equipment to Board Members.

Hotel, Restaurant and Commercial Gas Load Builders To Meet May 22-23

Executives, Outsiders and Manufacturers To Share A.G.A. Sales Conference Program With "Man On The Firing-Line"

Out to "Make It *Boom Times* for Commercial Gas Sales" the Industrial Gas Section of The American Gas Association announces its 1939 Conference on Hotel, Restaurant and Commercial Gas Sales. The Hotel St. George, Brooklyn, N. Y., has been selected as the place; and Monday and Tuesday, May 22 and 23, have been set aside as the dates. According to Frank B. Herty, Vice-Chairman of the Program and Arrangements Committee and the man appointed to the "engineering" of this Conference, "The aim of the meeting will be to develop methods for increasing sales of gas and gas appliances in one of the most profitable brackets of our business—the wholesale and retail commercial bracket."

The important matter of the possibilities for gas and gas-using equipment in the beauty-shop field will be handled by special symposium. In this manner each of the many knotty problems and the diverse opinions regarding gas hair dryers and related equipment will be brought before those attending the Conference.

Featured Luncheon Speaker will be Clifford E. Paige, President, The Brooklyn Union Gas Company; while R. J. Rutherford, Vice-President, Worcester (Mass.) Gas Light Co. and President, New England Gas Association—one of the most aggressive and original sales executives in the country—will close the Conference on the theme "The Where and How of Future Commercial Gas Sales." Other prominent gas industry executives are slated for rounding out management's participation in the program.

Outside viewpoints and worthwhile advice are anticipated from Peter G. Pirrie, Editor, Bakers Weekly, and W. D. Tiedeman, Chief, Bureau of Milk Sanitation, State of New York. Mr. Pirrie, one of the country's outstanding authorities on bakery operations and equipment, will tell gas men what routes to follow in "Selling the Baker" to his and the gas industry's mutual advantage. He will touch on equipment as well as sales technique. Mr. Tiedeman represents the State bureau which has jurisdiction over the administration of the New York sanitation laws which pertain to public eating places, and will talk on the objectives and administrative methods involved in these laws—especial emphasis being laid upon the sterilization of glassware, chinaware, and silverware in restaurants, hotels, and institutions.

F.H.A. Requires A.G.A. Approval on All Gas Equipment

A victory for gas appliances bearing the Approval Seal of the American Gas Association's Testing Laboratories is seen in the new specifications of the Federal Housing Administration covering the installation of gas appliances in housing projects. These specifications make it mandatory that gas appliances shall conform to the standards established by the Association. The FHA states that the approval seal of the Association's Testing Laboratories or certification of compliance with the approved standards of the Association shall constitute evidence of compliance.

More than 93 per cent of all domestic gas appliances sold in the United States have been tested and approved by the Association's Laboratories in compliance with national requirements.

Connecticut Light & Power Company Promotions

At the meeting of the Board of Directors of The Connecticut Light & Power Co. held on March 21st, Mr. R. H. Knowlton was advanced from Vice President to Executive Vice President and William T. Jebb was advanced from Assistant Superintendent to Manager of the Company's Waterbury Division.

Mr. Charles J. Allen was advanced to the newly created position of Director of Public Relations from his former position of Manager of the Waterbury Division; Mr. A. V. S. Lindsley was promoted from Sales Manager to Vice President in Charge of Sales.

Roscoe Nettles Reelected President of Tampa Gas Company

Rosco Nettles was re-elected president and general manager of the Tampa Gas Co. at the annual stockholders and directors meeting of the organization.

Other officers elected include E. P. Taliaferro III, vice president; H. P. Anderson, treasurer; and Mrs. Annie B. Smith, secretary. All have been connected with the company for a number of years except Mr. Taliaferro, president of the First National Bank, who becomes a company officer for the first time.

All directors were re-elected including Mr. Nettles, John B. Gribbel, Philadelphia; W. Griffin Gribbel, Philadelphia; J. Aubrey McCurdy, Philadelphia; W. W. Corkran, Philadelphia and Mr. Taliaferro.

The directors appointed the following officers; R. V. Wayne, assistant secretary and assistant treasurer; J. C. Huskisson, new business manager; H. S. Dossel, industrial engineer; Lambert Friederick, superintendent of manufacturing, and Frank V. Shafer, superintendent of distribution.

Tablet Unveiled at Baltimore Commemorates Founding of Gas Industry

On the occasion of the annual convention of the American Chemical Society which opened its sessions in Baltimore, Maryland, on April 3 the inauguration of a chemical industry in America—the manufacture of illuminating gas—through the founding of the first gas company in the United States was commemorated by the unveiling of a tablet on the building of Consolidated Gas Electric Light and Power Company of Baltimore, the direct descendant of the pioneer American company, which was granted its franchise in 1816. On behalf of the Maryland Section of the American Chemical Society, Dr. John C. Krantz introduced Professor S. C. Lind, President of the American Chemical Society, who said in part:

"Coal gas was first made by John Baptista Van Hilman in 1609. Murdock in Cornwall, England, lighted his own house with coal gas and in 1812 the first gas manufacturing company in the world was established for the city of London. In 1802 gas illumination was utilized in Baltimore by Benjamin Henfrey, and in 1816 Rembrandt Peale lighted his museum with gas made from a small plant back of this building. These buildings, we understand, are still standing. From this demonstration of Peale's came the founding of the Gaslight Company of Baltimore which we are honoring today. Following this founding of the Baltimore company, the New York Gaslight Company was put in operation in 1825 and the Boston Gaslight Company in 1828.

"The carburetted water gas process was invented in 1872, and, as is well known, the value of this gas to the industry is of enormous importance in that it affords great flexibility of output as water gas machines can be started and stopped as needed.

"Without going into the various chemical methods of the purification of gas, it is sufficient to say that the development of these processes has been one embracing fundamental chemistry, placing this industry definitely among the great industries of the country."

Left to Right: Dr. John C. Krantz, Professor S. C. Lind, Mr. Herbert A. Wagner.

In accepting the tablet, Mr. Herbert A. Wagner, President of Consolidated Gas Electric Light and Power Company of Baltimore, said:

"Officials and Members of the American Chemical Society and citizens:

"As the direct descendant of the company to which was granted the first gas franchise on this continent the Consolidated Gas Electric Light and Power Company of Baltimore gratefully acknowledges and accepts the tablet which the American Chemical Society has erected on this building.

"The founding of the Gas Light Company of Baltimore and the granting of the pioneer charter by the Mayor and City Council in 1816 marked the beginning of the first commercial use of gas in this country; and today the gas industry has grown to be one of the great chemical industries of the world.

"Twenty-three years ago the American Gas Centenary was observed in Baltimore to mark the successful completion of the gas industry's first one hundred years on this side of the Atlantic.

"Throughout the 122 years the supply of gas has been continuous. On the occasion of the Baltimore Fire in 1904, which destroyed the business section of the City, the supply of gas to Baltimore was uninterrupted.

"In thanking you for the honor that the American Chemical Society has conferred on the Company by the placing of this tablet, and wishing for you a most successful convention, marking, as it does, the silver anniversary of the founding of the Maryland Section, I want to extend a cordial welcome to those who desire to visit our Company's plants, and we shall count it a pleasure to have members of the Society do so."

D. P. Graham of Peabody Engineering Corp. on European Tour

Mr. David P. Graham, manager of the gas scrubber division of the Peabody Engineering Corporation of New York, sailed March 30 on the Nieuw Amsterdam for a European business trip. He will spend several weeks in England, Holland and France, returning in May.

Frederick W. Jesser Completes 50 Years of Service

Frederick W. Jesser, secretary of Consolidated Edison Company of New York, completed fifty years of service on March 31st. He has the longest service record of any man now in active employment on the electric side of Consolidated Edison's business.

In celebration of this occasion Mr. Jesser was the guest of honor at a luncheon given by 24 close business associates at the Terrace Club at the World's Fair. Oscar H. Fogg, vice-chairman of Consolidated Edison Company, presented a 50-year button to Mr. Jesser.

Born in New York City December 18, 1872, Mr. Jesser was educated in the public schools here and by private tutors.

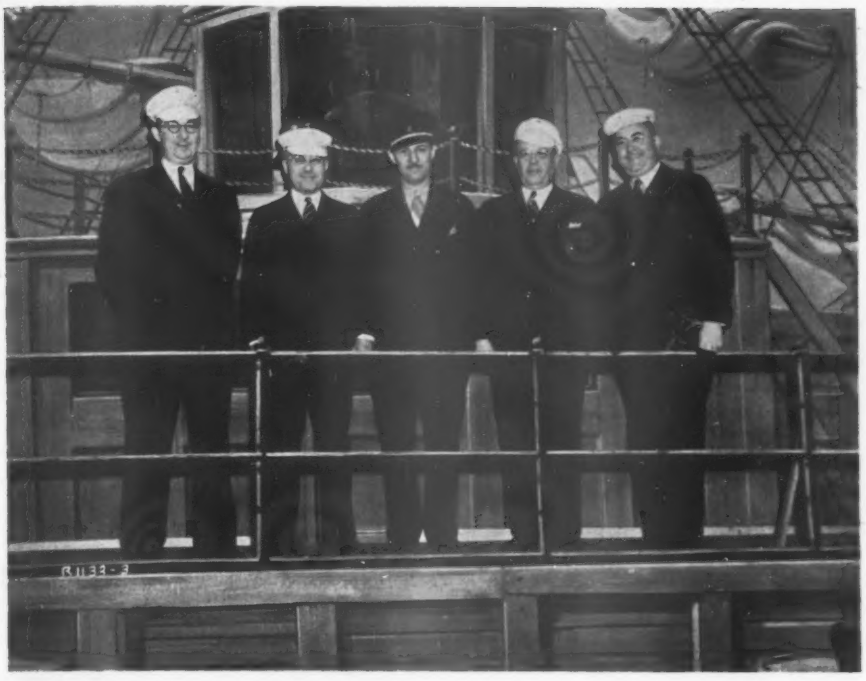
On April 1, 1889, a boy of 16, Mr. Jesser started work as stenographer for the Mount Morris Electric Light Company—an arc lighting company serving Manhattan west of Broadway from the Battery to the Harlem River. The city was its largest customer—for street lighting. He had just graduated from the Vermilion Stenographic and Typewriting School. He was glad to get the job, he remembers, although it paid only $10 a week for work from eight in the morning until six o'clock at night, six days a week.

Ten years later when the Mount Morris Company was consolidated with the Edison Electric Illuminating Company, a predecessor of New York Edison, he had risen to the post of assistant secretary. After the consolidation Mr. Jesser was transferred to the correspondence division where he became a special stenographer because of his extensive knowledge of the business.

Frederick W. Jesser

Six months later young Jesser was promoted to head the stenographic bureau of the company, in charge of a staff of eight. Two years thereafter he was appointed secretary to John W. Lieb, then the associate general manager, and later vice-president of the company. Although he became assistant secretary of New York Edison in 1920, and secretary in 1924, Mr. Jesser continued his close association with Mr. Lieb until the latter died in 1929.

When New York Edison and Consolidated Gas were merged in 1936, Mr. Jesser became assistant secretary of the new company. In July of last year he became secretary of Consolidated Edison.



Nothing "Petty" about these Officers:—They man the bridge while others "Man the Sales." This picture taken at the meeting shows, left to right: Hall M. Henry, asst. to president of New England Gas and Electric Assn.; J. J. Quinn, sales manager, Boston Consolidated Gas Co.; R. J. Rutherford, vice-president, Worcester Gas Light Co., also president of the New England Gas Association, and chairman of the A.G.A. Refrigeration Committee; Cyrus Barnes, asst. merchandising manager, New England Power Assn.; and H. R. Sterrett, president, New Haven Gas Light Co.

The New England Gas Association Meeting Launches Drive For Sale of Gas Refrigerators

At the annual meeting of the sales division of the New England Gas Association held at the Hotel Statler on March 31, which was attended by more than 400 delegates who represented all the gas utilities in New England, enthusiastic endorsement was given to the "Man-the-Sales" gas refrigerator selling campaign.

Unusual interest was manifested in the campaign in view of the fact that its main promotional feature — the offering of models of the Yankee clipper ship, "The Flying Cloud" as trophies to winning companies in the contest—has a distinct New England setting.

The building and launching of "The Flying Cloud" in Boston in 1851, and its momentous voyage around the Horn from New York to San Francisco in the same year was the theme of the meeting. It was pointed out that this 89-day voyage corresponded to the period of the "Man-the-Sales" campaign in which the sales forces of New England companies were urged to emulate the indomitable spirit of the skipper and crew of "The Flying Cloud."

George S. Jones, Jr., vice-president of Servel, Inc., manufacturers of Servel Electrolux refrigerators, congratulated the New England gas industry for the part it had played in "recognizing the value of selling gas refrigerators as an appliance that builds up the gas load."

R. J. Rutherford, vice-president of the Worcester Gas Light Association, the newly-elected president of the New England Gas Association, and also chairman of the A.G.A. Refrigeration Committee, said that "gas refrigeration belongs to the gas industry because it renders a new and better refrigeration service in the home, and because it can replace obsolete refrigerators with more satisfaction to the consumer."

Tribute was paid to former chairmen of the Refrigeration Committee who were New Englanders and all of whom were present at the meeting:—Messrs. Henry, Quinn, Rutherford, Barnes and Sterrett.

William Reynolds, advertising manager of Servel, Inc., emphasized the value of advertising as a means of "creating a reservoir of prospects which the refrigerator salesmen may tap speedily, directly and economically."

The final speaker on the program was C. A. Spiegel, sales promotion representative of Servel, Inc., who told the delegates of the enthusiasm with which the campaign is being accepted by gas companies in other parts of the country.

Food For Thought

1. 20,000 miles of mains surveyed.

2. 14,000 new gas leaks located.

3. 40,000 valuable reports made on trees and shrubs.

4. 150 companies using the service.

5. Enough savings in unaccounted for gas to pay the bill.

6. A trial will convince you.

May we hear from you?

New England Forestry Service Inc.

75 Federal St., Boston, Mass.

Tattersall Elected Chairman A.G.A. Publicity Committee

C. A. Tattersall of New York, secretary of the Niagara Hudson Power Corporation, has been elected chairman of the Publicity and Advertising Committee and a member of the Executive Board of the American Gas Association. He succeeds Henry Obermeyer, assistant vice-president of the Consolidated Edison Company of New York.

Mr. Tattersall has been with the Niagara Hudson Power Corporation and its affiliated companies for more than thirty years, serving at various times as assistant to the vice-president and general manager of the Niagara Falls Power Company, assistant to the president of the Buffalo Niagara and Eastern Power Corporation, vice-president of the corporation, assistant vice-president of Niagara Hudson, and finally secretary. He is director and vice-president of the American Management Association, a member of the Empire State Gas and Electric Association and of the Bankers' Club of America.

Court Approves Philadelphia Gas Works Deal

The Pennsylvania Supreme Court on March 24, according to a newspaper story, affirmed the right of Philadelphia's City Council to solve this year's budget difficulties by "selling" the rentals on the city-owned gas works for $50,000,000.

In a unanimous ruling, the court declared that "the balancing of the budget has been too long delayed". Its decision will enable the council to borrow the full amount sought, use $40,000,000 to pay off accumulated deficit and balance the budget, without levying new taxes.

The order grew out of a taxpayer's suit and was handed down at Pittsburgh. Councilmen planned to start work on Monday on the mechanics of accepting a proposal of the Philadelphia corporation to furnish the $50,000,000.

The 1939 budget, which has given councilmen many a headache since last Fall, apparently will total $116,000,000.

Record Selling In "Flying Cloud" Campaign Reported By A. G. A. Refrigeration Committee

Record selling of gas refrigerators by gas appliance salesmen participating in the "Man-the-Sales," or "Flying Cloud" contest during March and April warrants the prediction that this year's Spring and Summer gas refrigerator selling drive will be the most successful of any similar campaign conducted by the American Gas Association Refrigeration Committee, according to R. J. Rutherford, chairman of the Committee.

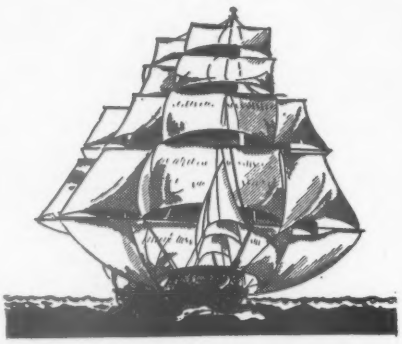
"Returns for the 'Rigging Up' contest during March, a month that was unusually cold and wintry this year in most parts of the country, received at the Committee's headquarters, showed that the 231 high salesmen entitled to cash awards had sold an average of over two refrigerators more than were sold by the March winners last year," Mr. Rutherford announced. "Reports from the field indicate that the selling performance of individual contestants during April, as the campaign gets into full swing, will show a similar increase over the April sales of 1938.

"It is also gratifying to the Refrigeration Committee to learn that the enrollment of gas utilities throughout the country in this year's campaign is greater than that of a year ago, a fact which indicates that the gas industry becomes firmer in its view that the demand for Servel Electrolux refrigerators is on the increase no matter what the economic situation may be.

"As each year comes around, the promotional features of the American Gas Association Refrigeration Committee make a greater appeal to the management of gas utilities and the men who sell Electrolux refrigerators than they did in the previous year.

"The offering of models of the famous clipper ship, 'The Flying Cloud,' to winning companies as the emblem of successful selling, and the naming of the April-May-June section of the drive as the 'Man-the-Sales' contest, has met with enthusiastic approval by men and management alike of the larger number of utilities that are now engaged in pushing gas refrigerator sales in an effort to win one of the trophies. Salesmen seem more eager than ever before to win their portion of the $30,000 in cash to be divided to those who make the highest selling achievements during the drive.

"Another factor which augurs well for the success of the contest is the objective announced at its beginning, namely the importance of keeping up the attack on the still great unsold market now using the most obsolete of refrigeration methods, the ice box or nothing. This market is the backbone of our sales potential this Spring and Summer, and the success thus far indicated that this market is being reached by a clear-cut approach to the problem of convincing home-owners in the low-income bracket of their ability to have gas refrigeration through the savings effected by the purchase of a gas refrigerator and the service rendered by the company.



"Two other markets which are being attacked in the campaign are those of refrigerators of another type which have been in use since the early days of automatic refrigeration, and the refrigeration that is needed in the thousands of new homes projected under the housing projects of the present year."

Lincoln Electric Opens Duluth Office

The Lincoln Electric Company, Cleveland, Ohio, announces the opening of a new office in Duluth, Minn., at 222 South 21st Avenue, East. A stock of electric welders, electrodes and supplies will be maintained for serving the Duluth area. Mr. I. R. Bartter, formerly with the Minneapolis office of the company, will be in charge of the new branch.

INDUSTRIAL GAS BOILERS
GARMENT PRESS BOILERS
100 lbs. ASME Code
¾ to 45 H.P.

P. M. LATTNER MFG. CO.
MAIN OFFICE
CEDAR RAPIDS, IOWA

Leonard C. Smyth with Roberts-Gordon

Mr. Leonard C. Smyth has recently joined the Sales Department of the Roberts-Gordon Appliance Corporation of Buffalo, N. Y.

Mr. Smyth will devote his time to the metropolitan area.

For twelve years Mr. Smyth was in the oil burner business and for several years was President of the National Oil Burners Dealers' Association.

Capt. Higgins Heads Sales of Pittsburgh Equitable Meter and Merco Nordstrom Valve

In a recent announcement, Col. W. F. Rockwell, President of the Pittsburgh Equitable Meter Company, stated that Capt. A. E. Higgins, a vice-president of the firm, has been placed in charge of sales for both the Pittsburgh Equitable Meter Company and its subsidiary, the Merco Nordstrom Valve Company.

Captain A. E. Higgins

Before he became associated with the Pittsburgh Equitable Meter Company, Capt. Higgins was secretary of the Natural Gas Section of the American Gas Association. He has long been a prominent figure in the Gas Industry.

Albert Rapfogel Represents Standard Gas Equipment Corporation in Midwest

Appointment of Albert Rapfogel, popular manufacturers' representative with offices and showrooms at 700 Prospect Avenue, Cleveland, as Midwest territorial representative of the Standard Gas Equipment Corporation, manufacturer of gas ranges, has been announced by H. C. Erhard, General Sales Manager of Standard Gas Equipment Corp. General sales offices of the stove manufacturing concern are at 18 East 41st Street, New York City, N. Y.

Obituary

GEORGE G. SUMMERS

George G. Summers, well-known among gas men throughout the United States, died in Omaha on March 27th. He was educated at University of Edinburgh and Gordon College, London, where for three consecutive years he was winner of the annual engineering prize; he later obtained his practical engineering experience aboard Scottish Merchant Marine vessels.

Mr. Summers came to the United States in 1893 as chief draftsman for shipyards in San Francisco. He started a short time later as draftsman of the Peoples Gas Light & Coke Co., Chicago, and became superintendent of the North Side Station and later operating engineer.

George G. Summers

With the Indianapolis Gas Co., he was Operating Engineer at the time it became municipally owned.

In 1915 he went into the Consulting Engineering business, doing work for Bethlehem Steel Co. and The Brooklyn Gas Co., as well as designing operating stations for gas and power companies in several mid-western cities.

His last service was with the Metropolitan Utilities District of Omaha, Nebr., where he was superintendent of manufacture from the time the city purchased the gas plant in 1920 until his death.

Mr. Summers was well known in gas circles and was long a member of the A. G. A. and the old Western Gas Association.

JOHN R. FENNIMAN

John R. Fenniman, treasurer of the Consolidated Edison Company of New York, Inc., died of a heart attack at his home, 484 East 17th Street, Brooklyn, on April 21st.

Mr. Fenniman was born in Brooklyn in 1879. He began his business career with the Brooklyn Union Gas Company as a collector, later becoming bookkeeper, cashier and assistant to the manager of the district office.

He went to Consolidated Gas Company (predecessor of Consolidated Edison Company) as a clerk in 1904 and later established the first information bureau for the company in its Third Avenue District Office. In 1905 he was made assistant superintendent at Third Avenue and a year later superintendent of the new district office at 1911 Amsterdam Avenue.

In 1919, Mr. Fenniman became assistant general superintendent of the Commercial Department of the Consolidated Gas Company. Three years later he was put in charge of placing a new stock issue among customers and employes of the Gas Company. In 1923 he was appointed assistant treasurer, and in 1929 became treasurer. He continued as treasurer when mergers of various companies in the group formed the present Consolidated Edison Company.

A. H. CAMPBELL

Archibald Hamilton Campbell, retired vice-president of the Consumers' Gas Co., Toronto, Ont., died recently at his residence, 87 Bedford Rd., that city, at the age of 75. Born in Kingston, he was educated at the University of Toronto and in Scotland. Mr. Campbell was once manager of the Muskoka Mill Lumber Co. and a director of the Bank of Toronto and Toronto General Trusts Corp. He was also prominent in the Red Cross Society, Serbian Red Cross, St. James' Anglican Cathedral, and several sport organizations.

Catalogs

Gas Meters. Tinned Steelcase Meters for gases and air are fully described and illustrated in a 38-page catalog—TG4—issued by American Meter Company, 60 East 42nd St., New York.

Besides the adequate space devoted to important new developments in tinned meter design and construction, the actual evolution of these meter types also is described in considerable detail.

Such engineering background contributes to a better understanding of the subject and affords reference material of permanent value.

Telemetering Device. A new bulletin, 194-A "Bailey Synchro-Meter" is now available from Bailey Meter Company, Cleveland, Ohio. It presents a simple electrical mechanism which is said to accurately transmit and indicate, record or integrate the measure of any factor, such as flow, level, pressure and temperature at a distant point.

This 16 page bulletin points out that metering equipment operated on this principle has accuracies equivalent to mechanically operated metering equipment.

Wiring diagrams illustrating the principle of operation are included.

Ranges. An illustrated folder, G1-39 describes the many models of "Quality" gas ranges marketed by Roberts & Mander Stove Co. of Hatboro, Pa. In addition to the models illustrated the special features are shown and described in considerable detail.

"Indicating Gauges," a new eight-page bulletin 229 issued by The Foxboro Company, sets forth the functions and advantages of Foxboro gauges where pressure is an important factor.

A cross-sectional illustration of the mechanical construction of the Model P gauge clearly outlines the entire movement of the instrument. Illustrations of the refinery, hydraulic and test gauges are accompanied by complete descriptions of such advantages as their all-welded spring assembly, threaded ring, stainless dial and pointer and nitrided steel pinion, segment and arbor.

The final page of the booklet illustrates and describes Foxboro accessories available to adapt gauges to any desired application.

Temperature Controllers. Bulletin 225, issued by Foxboro discusses the factors governing the choice of temperature controllers, and outlines the types of air-operated controllers with which to meet particular industrial needs.

Copies of these bulletins may be had by writing to The Foxboro Company, Foxboro, Mass.

Fittings and Couplings. Raybould fittings and couplings for steel pipe manufactured by Raybould Coupling Co. and distributed by Pittsburgh Equitable Meter Co. of Pittsburgh are described and illustrated in much detail in their 12 page bulletin M-700. Dimensions, specifications and list prices are given. Copy of this bulletin sent on request.

Condensers and Coolers. In bulletin 1601 of The Griscom-Russell Co., 285 Madison Ave., New York, "Bentube" sections used in condensers for the oil and gas industry are described and illustrated. This 24 page bulletin includes flow sheets showing typical applications of the equipment and several useful charts and tables.

Solvent-Resisting Tubing. Under the trade name "Resistoflex," a new flexible tubing impervious to oils and many organic solvents is described in a folder recently issued by Resistoflex Corporation, 370 Lexington Ave., New York. The same product will shortly be available in the form of gaskets, washers, packing, diaphragms and sheet material.

Orifice Meters. EMCO Orifice Meters, Type 38 are shown in much detail in a 20 page bulletin No. 1050 issued last month by Pittsburgh Equitable Meter Co., 400 North Lexington Ave., Pittsburgh. Phantom drawings give a complete picture of the entire inside of the meter. Many diagrams and details of parts are included.

Rural Gasification Activities

(Continued from page 50)

customers not yet fully equipped with all the appliances they need. We find that it takes about 250 customers in each district to make the venture profitable — considered strictly from the distributor's angle. It so happens that we have natural gasoline plants that furnish our own butane; however, no producer's profit is included in the above statement.

In the cautious and careful manner in which promotion work has been carried on to date, we find that we attach in each district from 125 to 175 customers per year, so that it may be safely predicted that an individual district should be on a profitable basis within two years' time.

An analysis of the 1930 census was made covering the counties in Texas, alone, in which Lone Star Gas System had distribution organization and disclosed, after all Negro and Mexican population was eliminated, that 170,000 white families were without gas service. This was then broken down as to the number of rural families into farmers and those who were non-farmers, suburbanites or living in small towns. The farm families were broken down further into those who owned the farm and operated it and those who were tenants. Of the farm families who own their farms, we assumed that we would ultimately attach 20%, or 1 out of 5 families; of the tenant farmer, 5%, or 1 out of 20 families, and of the non-farm families, 20%, or 1 out of 5, thus, arriving at a rather conservative potential market for each county. Those counties then that showed a potential of less than 250 customers were eliminated. Also, those counties having considerable gas production with many lines laid across the county were eliminated. The remaining counties, showing a potential of 250 or more customers, totaled 20,000 potential rural customers adjoining Lone Star System.

I presume that corresponding figures are available from the Department of Commerce on every state and county in the Union, and they may disclose an interesting picture on your own territory.

It appears that the existing organizations and facilities of the present gas companies definitely place them in a most advantageous position to expand their services and secure for themselves additional revenues from this rural market. If the gas industry does not take advantage of this temporarily strategic position it has with respect to this market, the market is going to be served by someone else. In the last 18 months possibly every member in this meeting has become familiar, to some degree, with the activities of a local butane gas company, and these companies are doing a most creditable job in spite of their inexperience and in many cases lack of capital.

Are we, as operating gas companies, overlooking a new source of revenue when the rural gasification activities in our respective territories are being carried on by someone else?

Natural Gas in Oklahoma

(Continued from page 11)

storage of natural gas in abandoned pools. Crude oil can be stored in steel tanks. Gas, however, when once it reaches the surface, is gone just like cigarette smoke. Several of the larger companies are experimenting with underground storage reservoir possibilities, the ultimate object being to put back into depleted reservoirs natural gas which otherwise would be wasted through lack of market. A study is now being made in Oklahoma of the possibility of introducing natural gas under high pressure into several rapidly depleting oil fields, the intention being to increase oil production, increase gasoline content of casinghead gas coming out of the oil, and, ultimately, to market a large portion of the gas pumped back into the oil sand.

Natural gas has always been and forever will be an interesting game of tomorrow. Wise management of natural gas companies must plan one decade in advance at all times. These plans inevitably result in the expenditure of vast sums of money in taking up old lines and in the extension of new lines, which do not always pay out. The history of natural gas in Oklahoma records instance after instance where pipe lines have been laid to producing gas fields, the production from which did not pay for the labor on the line.

FUNGUS MOLD

is unknown where GPM IRON HYDROXIDE *is in the purifier*

Many plants have been experiencing trouble and expense due to the formation of a fungus mold crust in the purification box. In contact with organic sulphur this mold releases hydrogen sulphide; the result is trace trouble. When the oxide is dumped, trays and box sidewalls must be chemically scrubbed to eliminate the tenacious mold.

Where GPM Iron Hydroxide *is used, fungus mold together with the trouble and expense it creates, is absolutely unknown.*

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GAS PURIFYING MATERIALS COMPANY INC.

Long Island City & Providence

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Coal Gas Plants—Horizontal Ovens, Benches, Refills, Additions, Repairs, Charging and Discharging Machines.

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Oil Gas Plants—"Refractory Screen" Process for Base—Standby or Peak Loads — On Existing or New Water Gas Sets—Low or High B.T.U. Gas.

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For Sound Values and Continuous Operating Economy. Meters for Domestic and Industrial Use, All Sizes 5B to 60C.

Wet Test and Demonstration Meters
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Superior Meters are built to A. G. A. specifications to provide complete protection against leaks and costly repairs. Write for details and quotations.

SUPERIOR METER COMPANY

167 41st Street ***Brooklyn, N. Y.***

TABLE OF THE ONTARIO NATURAL GAS INDUSTRY, 1921-1936

Year	Rate cents per M.C.F.	No. of pay consumers	Total quantity used MCF	Quantity per consumer MCF	Capital invested in all natural gas operations	Employes	Wages paid
1921	47	58,609	5,937,316	101.3	$17,328,757	632	$592,606
1922	47	63,229	6,028,947	95.3	17,769,664	692	539,072
1923	50	62,352	6,210,459	99.6	25,570,972	603	633,365
1924	55	61,100	5,933,595	97.1	24,781,723	727	639,167
1925	56	62,338	5,300,424	85.6	26,111,387	692	625,826
1926	57	63,695	5,595,521	87.8	30,500,874	860	842,305
1927	60	66,818	5,210,315	78	31,987,879	1,123	1,148,339
1928	60	70,259	5,699,553	71.2	36,601,828	1,209	1,497,999
1929	58	80,991	6,336,678	78.2	35,162,736	1,323	1,529,367
1930	64	84,135	6,332,519	75.2	36,162,268	1,328	1,545,648
1931	62	86,050	5,607,744	65.1	42,921,142	1,241	1,383,286
1932	63	86,631	5,409,154	62.2	45,982,719	893	1,059,643
1933	63	84,933	5,102,340	60	51,766,592	958	958,336
1934	62	89,990	5,262,631	58.5	41,934,395	931	1,010,979
1935	60	118,719	5,553,902	46.8-52	42,975,846	1,273	1,219,520
1936	60	118,117	6,956,453	59.3	45,197,240	1,336	1,354,611

The foregoing table includes drilling operations.

(Continued from page 26)

natural gasoline from the Tilbury gas were made in the early days of that field: only to disclose that the practically dry gas was unsuited to this purpose. A carbon black project was mooted about the same time: but the value of the gas for domestic purposes put this scheme out of court.

The Tilbury development introduced, however, a new problem—purification. The earlier gases from the Niagara-Haldimand areas had been sweet and odorless. The Tilbury gas however contained a small percentage of sulphuretted hydrogen. In the earlier stages, the companies marketing Tilbury gas offered individual purifiers; which, however, were rarely used.

Experiments were made with central purification following 1913, when gas from the Tilbury field began to displace the sweet gas previously used in communities further east. The first fully successful central purification plant was that installed for the Union Gas Co. at Port Alma by the Koppers Company of Pittsburgh in 1924, the process consisting of washing the gas in a solution of soda ash. A similar plant at Glenwood serves the Southern Ontario Gas Co. system.

With the later discovery of similar gas in the Brownsville field, the Oxford Pipe Line Co., which delivers part of the Brownsville production to the Southern Ontario Gas Co., in 1937 built a small purification plant in which the gas is passed through a series of tanks containing a lime solution. Two similar plants were later constructed by the Central Pipe Line Co. to purify the gas for its own system, and for the Dominion Natural Gas Co.

Extent of Ontario's Natural Gas Industry

In 1936, the last year for which complete official figures are available, natural gas was furnished to 107 urban communities with an aggregate population of 625,587. There were 109,406 pay and 121 free urban consumers, quantities of gas consumed, being: pay, 6,356,188 M. cu. ft.; free, 38,742 M. cu. ft.; and industrial, 1,729,395 M. cu. ft.

To reach these urban communities the various transmission lines traversed and partly served 81 townships in 13 different counties, representing an aggregate population of 228,222. There were in these townships, 8,711 pay and 667 free consumers, gas used amounting to: pay, 600,265 M. cu. ft.; free, 135,618 M. cu. ft. and industrial, 83,104 M. cu. ft.

The Natural gas industry in Ontario is under the supervision of the Ontario Mines Department, with Hon. Paul Leduc, K. C. as minister of mines. Actual supervision is in charge of Col. R. B. Harkness, Natural Gas Commissioner, of Toronto, with James Sanson of Petrolia as oil and gas well inspector. Rate questions are dealt with by Natural Gas Referee H. J. McNulty, K. C., of Ottawa, subject to certain limited rights of appeal.

Ontario's Position in Relation to the Canadian Natural Gas Industry

The following table indicates the position of Ontario in relation to the other natural gas producing provinces of the Dominion, and particularly the extent of the transmission and distributing lines. Since this table was compiled, some extensions have taken place.

There is a nominal production in Manitoba and the North West Territories.

Summary of Industry by Provinces

Province	Gathering and Transmission (miles)	Distributing Lines (miles)	Production, M. cu. ft.	Value, $
New Brunswick	20	60	606,246	298,819
Ontario	2,112	1,830	10,006,743	6,052,294
Saskatchewan	1	5	90,839	33,985
Alberta	593	545	17,407,820	4,376,720

New Gas Well at Brownsville

The third big well in the gas field of the Oxford Pipe Line Co., at Brownsville, Ont., was brought in recently on the property of George Clarke by the McKecknie drilling outfit of Dunnville. The well produces an estimated 1,200,000 cubic feet of gas daily.

New Contract for Koppers Co.

The Wheeling Steel Corporation has awarded a contract to Koppers Company for the design and construction of Benzol refining apparatus and equipment at its Koppers by-product coke plant in Follansbee, W. Va. The contract also includes the modernizing of the corporation's Ammonium Sulphate drying and Tar removal equipment.

Light oils produced in the Koppers coking process will be refined to obtain motor fuel, Benzol, Toluol and Xylol.

HUGHES PRINTING CO.
EAST STROUDSBURG, PA.